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AVIATION AND AIRCRAFT JOURNAL

The Curtiss-Navy Racer on which Bert Acosta Won the Second Pulitzer Race.

VOLUME XI
Number 20

Four Dollars a Year

SPECIAL FEATURES

AIR STRENGTH OF THE GREAT POWERS
THE FLYING MEETS AT KANSAS CITY AND OMAHA
THE ORENCO "TOURISTER II"
"WHO'S WHO IN AMERICAN AERONAUTICS"
EFFECT OF LOW GRADE GASOLINE ON ENGINES

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

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LANGLEY FIELD, VA.

We Must Realize

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--that in the modernizing of our present systems of transportation and in meeting competition, aircraft will be a predominating feature

--that there is a very definite possibility of using aircraft in the solving of our transportation difficulties.

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FACTS ON FLYING BOAT TRANSPORTATION

First Annual Report of Commercial Aviation Operations ever made in the United States compiled by the Aeromarine Airways for the Bureau of Aeronautics, Navy Department, Washington, D. C. For the Year ending October 27th, 1921.

From: AEROMARINE AIRWAYS, Inc.
1800 Times Bldg., New York City.

To: ADMIRAL W. A. MOFFETT,
Director of Naval Aviation,
Navy Building,
Washington, D. C.

Subject: First Annual Report of Commercial Flying Operations.

TOTALS

Passengers carried	6,814
Miles flown	95,020
Accidents	NIL
Mail and freight lbs.	29,002

The operation of the Aeromarine-Navy flying boats in the commercial transportation of passengers, mail and freight for the period commencing October 27, 1920 and ending October 27, 1921, is herewith submitted.

1. Six eleven-passenger flying cruisers of F5L type in operation carried 1,044 passengers 42,000 miles in the air and transported 24,002 lbs. of mail and 5,000 lbs. of freight and baggage, exclusive of crews.
2. Six Navy Coast Patrol five-passenger flying boats of HS2L type carried 4,762 passengers 34,920 miles in the air, exclusive of crews.
3. Three Aeromarine three-place flying boats carried 1,008 passengers 18,100 miles, exclusive of pilots.
4. Not a single passenger or employee was injured during these operations. The schedule was maintained throughout with the exception of four forced landings during adverse weather conditions which caused only slight delays. These delays were less than those suffered by railroads in slight snowstorms. The flying boat "NINA" was torn from her moorings one night in Havana Harbor during a terrific gale, blown against some rocks and damaged beyond repair. No one was aboard at the time.
5. The services maintained include Key West - Havana; Florida - Bahama Islands; New York, Atlantic City and New England ports; New York Sight Seeing; New York - Albany; Great Lakes region; Mississippi River Valley.

SUMMARY

The eleven-passenger Navy F5L flying boats operated in the Key West - Havana Service during the Winter months, after which four of them were laid up for the Summer. The remaining boat, "SANTA MARIA" then undertook a flight from Key West up the Atlantic Coast to New York, up the Hudson River, over Lakes George and Champlain to Montreal, along the Great Lakes to Chicago and thence by way of the Illinois and Mississippi Rivers to New Orleans, thence along the Gulf to Key West, a total distance of 7,000 miles.

Of the six HS2 flying boats four were in constant operation and two were in reserve. One of these boats made a complete circumnavigation of the Great Lakes flying 7,491 miles and carrying 500 passengers; another covered the New England States.

For operations during the coming year six of the Aeromarine-Navy eleven-passenger flying cruisers will be placed in operation on the Key West-Havana route and between Palm Beach and Miami and Bimini and Nassau; two other flying cruisers of the same type will be held in reserve for special chartered parties.

For the other services seven of the five-passenger Aeromarine-Navy HS2 type will be placed in active operation and ten others will be held in reserve for special charters.

Three of the Aeromarine three-place flying boats will be used for special services and special charters, with two of these same types held in reserve.

Very truly yours,
AEROMARINE AIRWAYS, Inc.,
(Signed) C. F. REDDEN
President.

The Aeromarine Airways is today the largest Aerial Transportation Company in the world operating flying boats exclusively.

The experience gained in the successful operation of aircraft for commercial purposes, representing an investment of many hundreds of thousands of dollars, is furnished to purchasers of Aeromarine Flying Boats. There is no other Aerial Transportation Company in North America that has this information available.

There are many Cities that can use Aeromarine Flying Boats for the establishing of Airways. We have a limited number of new Aeromarine-Navy Flying Boats for sale and are accepting orders for Spring delivery. Write for catalog and dealer's proposition.

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NEW PRODUCTION

	List Price	
'ORIOLE'		
With OX5 Motor	$3000.00	F. O. B. Buffalo, New York
With K-6 Motor (1919)	$4400.00	" " "
With C-6 Motor (1920) and large surfaces	$4800.00	" " "
'SEAGULL'		
1919 K-6 Motor, dual stick control	$5200.00	" Garden City, L. I.
1920 C-6 Motor, dual dep control and balanced ailerons	$5600.00	" " "
'STANDARD'		
With C-6 or K-6 Motor	$3600.00	" " "
'MOTORS'		
C-6 or K-6 (150 H.P.)	$3000.00	" Buffalo, New York

GOVERNMENT TRAINING PLANES

'JN'S'		
JN4D with new OX5 Motor	$2400.00	F. O. B. Dallas, Texas
JN4A, B, C & D used, with overhauled OX5 Motor	$1200 to $2200.00	" " "
'STANDARDS'		
With new OX5 Motor	$2000.00	" Houston, Texas
With overhauled OX5 motor	$1700.00	" " "
Without motor, rebuilt for OX5	$1100.00	" " "
Without motor, rebuilt for K-6 or C-6	$1600.00	" Garden City, L. I.
Without motor, as received from Government	$800.00	" Houston, Texas
'MOTORS'		
OX5 New	$800.00	" Various concentra-
OX5 Overhauled	$600.00	" tion fields.
OX5 As received from Govt.	$500.00	" " "

CURTISS AEROPLANE & MOTOR CORPORATION

GARDEN CITY LONG ISLAND

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Member of the Audit Bureau of Circulations

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THOMAS-MORSE AIRCRAFT CORPORATION

On Its Metal

"BUILT LIKE A YACHT" once was a common saying to express highest praise for fine workmanship. All men knew that the ship builder was called upon to make joints better than the carpenter, finish wood finer than the cabinet maker, and forge metal with more skill than the blacksmith.

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It is the faithful application of these methods which makes The Glenn L. Martin Bomber the acknowledged superior war plane of America.

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GEORGE NEWBOLD, BUSINESS MANAGER

AVIATION AND AIRCRAFT JOURNAL

LADISLAS D'ORCY, EDITOR
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The Growing Importance of Air Power

IN connection with the conference on the limitation of armaments many newspapers and magazines are publishing comparative articles setting forth the relative military and naval strength of the principal powers. It is strange to note that in these comparisons air strength does not figure at all. Whether this omission is due to ignorance of the subject, or to difficulties encountered in gathering the relative information, or to the popular conception that the aerial arm is nothing but a branch of the armies and navies of the world—all this is immaterial as against the one outstanding point that the American public is not being informed about the relative standing of the world's air forces.

When it is realized that the country which has a preponderance of air power at the start of hostilities possesses the instrument with which it can strike at the enemy far in advance of the latter, and with unparalelled suddenness, the importance of computing the air power of the various nations will be better appreciated. An aerial surprise attack assumes with every month that passes by an increasing potentiality, for aeronautical progress ceaselessly advances on the path of endowing aircraft with more speed and carrying capacity. Soon the time will come when even the splendid isolation which the Atlantic and the Pacific now afford to America will be a thing of the past.

It is with this vision of the near future that AVIATION AND AIRCRAFT JOURNAL presents to its readers in this issue a compilation of the fighting strength and organization of the chief air powers of the world. Despite the considerable work involved in gathering this material, the compilation is unfortunately incomplete, but such as it is it will enable our readers to form a clearer picture of the nations' air strength than was hitherto available.

The Second Pulitzer Trophy Race

THE second annual competition for the Pulitzer Trophy has been the occasion of a magnificant demonstration of the intrinsic worth of American pilots, airplanes and aircraft engines. The speed of 176.7 m.p.h. made by the winner, Bert Acosta, on the Curtiss-Navy racer, beats any previous similar performance made here or abroad in competition.

While the winning machine represents a new design, it is gratifying to note that the Curtiss "Cactus Kitten" flown by Clarence Coombs, which was built for the 1920 Gordon Bennett race, finished second at 170 m.p.h., or at an average speed in excess of that made by the winner of the last Gordon Bennett race. If it is considered that this machine, originally designed as a monoplane, was given triplane wings to slow down its landing speed, and that this also reduced its high speed, it becomes obvious that the "Cactus Kitten" was at the time it was built the fastest machine in the world—as the Curtiss engineers intended it to be.

Wanted: An American Soaring Competition

THE remarkable results which the second German soaring competition achieved, and the even more remarkable performances German soaring fliers accomplished since that contest have found a vigorous echo in the neighboring French Republic. France, which today has achieved undoubted ascendancy in both military and civil aeronautics, could not remain indifferent to this new branch of human flight which, its advocates believe, will bring about a reduction in the mechanical power required for keeping heavier-than-air machines in the air. Hence it is not surprising to hear that at the end of this month there will occur in Paris a Congress of Motorless Flight which will attempt to reduce the problem of soaring flight to common terms, in anticipation of a French soaring contest to be held next summer.

The importance French aeronautical circles attach to this convention may be seen from the fact that it will be held under the auspices of the French air minister, and that its patrons include men well known in aviation as Messrs. Blériot, Bréguet, Archdeacon and Marchis.

Thus the country of Mouillard answers the challenge of Lilienthal's country. Such being the case, the question occurs as to what contribution Langley's country is going to make to this latest branch of aeronautics? It will come as a surprise to many people to see Langley's name mentioned in connection with soaring flight. Yet, his name is as well known to students of soaring flight as those of Mouillard and of Lilienthal, for his discovery of the "internal force of the wind", that is, the pulsating force which is believed to exist within a given air stream, appears to afford the key to the whole problem of soaring motion.

It should be well understood that soaring is absolutely distinct from gliding. In a gliding flight the machine starts from an elevation and covers a greater or lesser distance according to the strength of the ascending air currents, but *losing altitude* all the time. In a true soaring flight no ascending currents are required: Harth, the German experimenter, in his 21-minute flight, maneuvered all the time over an ondulating plain, where the possibility of rising currents was precluded, merely utilizing a strong gusty wind. He flew both against and with the wind *without losing altitude;* he climbed some 400 ft. during his flight, and when he landed he was only 40 ft. below his starting point.

This point having been made clear it appears necessary to emphasize that lest America be outdistanced in this new art, preparations should at once be made to hold both a convention of motorless flight and a soaring competition. Here, it seems, is a splendid opportunity for the Aero Club of America to take the lead, as in days of old, and galvanize American energies and resourcefulness into channels which will lead us a new path in the conquest of the air.

Air Strength of the Great Powers

In connection with the conference on the limitation of armaments which has convened in Washington, D. C., AVIATION AND AIRCRAFT JOURNAL presents to its readers a compilation of the fighting strength of the principal air powers of the world, namely, the United States, France, and Great Britain. With regard to Italy and Japan the information on hand is unfortunately of the scantiest nature. Italy demobilized after the signing of the peace treaties the greater portion of its fighting air services, so that they now merely form a nucleus. This is now being reorganized, but the final form the new Italian air establishment will assume has not—so far as we know—been definitely settled as yet. As to Japan, the fighting air services of that country are still in the formative stage, French air officers training the army air service, while British air officers are organizing the naval air service.

No attempt has been made to work out a comparison of the relative strength and efficiency of the air forces listed below, the main reason being that no "index value" has yet been devised to compare fighting aircraft of the different classes. One pursuit machine may have a greater horizontal speed than another, but climb at a lesser rate of speed; or again, one bombardment airplane may carry a greater load of bombs than another but have a lower speed and ceiling. If, furthermore, attention is paid to certain design features such as safety factor, maneuverability, landing speed, etc.—all of which seem to defy their being compounded into a formula—the extreme difficulty of establishing an adequate comparison between fighting air services will become apparent.

The naval custom of comparing fighting ships by displacement-efficiency as affected by their constantly increasing obsolescence does not seem applicable to military aircraft, excepting perhaps airships. In the case of the latter the displacement, or capacity, may be taken as a criterion of their fighting efficiency, for the newer and the larger a military airship the more will it be likely to embody improved means of defense and offense. The age plays of course an important role in a consideration of military airplanes too, but there does not seem to exist any single factor in heavier-than-air craft which affords means for suitable comparison like the displacement of war ships.

The only possible comparison of fighting air services is one which is based on the number of service squadrons, but even this will be fairly correct only if the squadrons considered all have the same strength—which is not always the case. While the American and French aviation squadrons consist of twelve airplanes, the British R.A.F. squadron is composed of eighteen airplanes, so that a comparison between American and British air strength which is purely based on the respective number of squadrons in service will be correct only if the British figures are increased by 50 per cent. This is merely mentioned to show some of the lesser difficulties that have to be solved in working out a comparison between fighting air services.

Another point which complicates any such comparison is that where naval air services exist independently of the army air services, such as in this country and in France, it is next to impossible to obtain accurate figures regarding the fighting strength of the *naval* air service in question. This condition applies even if the total number of service seaplanes in commission were known, and is due to the fact that a sea-going air service follows the naval custom of having a "fleet" of aircraft out of which formations are temporarily created, whereas an army air service has permanent air formations, like the corresponding units in the other branches of the army.

In this respect it should be noted that whereas the air strength of Great Britain listed below is that of the Royal Air Force, which includes both army and naval aeronauties, in the case of the United States and France the naval air strength is not included for lack of precise information.

Airships are not included in this compilation, as the lighter-than-air services of France and Italy are practically demobilized, and exist only as training formations, while the Royal Air Force has entirely discontinued the operation of airships. In the United States both the Army and the Navy operate airships.

United States

U. S. Army Air Service

Fighting strength: 35 aviation squadrons.
11 balloon companies.
6 airship companies.

Personnel: The personnel strength of the U. S. Army Air Service is fixed by the Army Re-Organization Act, 1920, at: one Major-General (the Chief of Air Service), one Brigadier-General (the Assistant Chief of Air Service), 1,514 officers ranking from Colonel to Second Lieutenant, and 16,000 enlisted men. In the latter number are included 2,500 Flying Cadets.

The present personnel strength of the Army Air Service is, however, owing to inadequate appropriations far below the figures provided for it in the Act of 1920. On Sept. 17, 1921, the personnel of the Army Air Service comprised 955 officers, 7,160 enlisted men and 164 flying cadets, or a total of 8,319.

Organization: The tactical unit of the aviation arm is the squadron, which consists on peace footing of a headquarters and two flights of six airplanes each. The personnel of a squadron varies at full strength between 155 and 172 officers and men.

Three or more squadrons form an Aviation Group, and, as a war time provision only, three or more groups form a Wing.

The tactical unit of the balloon and airship arm is the company. Two balloon companies and two airship companies form a Balloon Group. The personnel of a balloon or airship company comprises 138 officers and enlisted men.

Stations of American Air Troops

(U. S. Army Air Service)

Office, Chief of Air Service: Washington, D. C.

WINGS

1st Wing—Hdq. at Ellington Field, Houston, Tex. Functions as a headquarters only and does not control any organization.

AVIATION GROUPS

1st Group (Pursuit). Hdq. at Ellington Field Houston, Tex.
17th Sq. (P)
27th Sq. (P)
94th Sq. (P)
95th Sq. (P)
Air Park No. 2.
Flying Cadet Detachment.

2d Group (Bombardment). Hdq. at Kelly Field, San Antonio, Tex.
11th Sq. (B)
20th Sq. (B)
49th Sq. (B) Temporarily at Langley Field.
96th Sq. (B)
Photo Sections No. 1, 2.
Air Parks No. 4, 5.

3d Group (Attack). Hdq. at Kelly Field, San Antonio, Tex.
8th Sq. (A)
13th Sq. (A)
26th Sq. (A) —Organizing.
90th Sq. (A)

4th Group (Observation). Hdq. at Manila, P. I.
2d Sq. (O)
3d Sq. (P)
28th Sq. (B) —Organizing at Mather Field.
Photo Section No. 6.
Ball. Co. No. 17.

Ball. Co. No. 27
Air Park No. 11.

5th Group (Observation). Hdq. at Luke Field, Pearl Harbor, H. T.
4th Sq. (O)
6th Sq. (P)
19th Sq. (P) —Organizing at March Field.
23d Sq. (B) —Organizing at March Field.
Photo Section No. 11.
Ball. Co. No. 3.
Ball. Co. No. 21.
Air Park No. 10.

6th Group (Observation). Hdq. at France Field, Panama Canal Zone.
7th Sq. (O)
24th Sq. (P) —Organizing at Mitchel Field.
25th Sq. (B) —Organizing at Mitchel Field.
Photo Section No. 12.
Air Park No. 8. Organizing at Mitchel Field.
Two balloon companies to be organized.

BALLOON GROUPS

1st Balloon Group. Hdq. at Brooks Field, San Antonio, Tex.
Ball. Co. No. 4.
Ball. Co. No. 5.
Airsh. Co. No. 8.
Airsh. Co. No. 16.

AVIATION SQUADRONS

1st (O).....Mitchel Field, N Y.
2d (O).....Kindley Field, P. I.
3d (P).....Clark Field, P. I.
4th (O).....Luke Field, H. T.
5th (O).....Mitchel Field, N. Y.
6th (P).....Luke Field, H. T.
7th (O).....France Field, C. Z.
8th (A).....Flight "A": Kelly Field, Tex.
Flight "B": Pope Field, N. C.
9th (O).....Mather Field, Calif.
11th (B).....Kelly Field, Tex.
12th (O).....Kelly Field. Temporarily at Ft. Bliss.
13th (A).....Kelly Field, Tex.
14th (B).....Flight "A": Langley Field, Va.
Flight "B": Aberdeen, Md.
15th (O).....Chanute Field, Ill.
16th (O).....Ft. Riley, Kans.
17th (P).....Ellington Field, Tex.
18th (O).....Rockwell Field, Calif.
19th (P).....Luke Field, H. T., Organizing at March Field.
20th (B).....Kelly Field, Tex.
22d (O).....Post Field, Okla.
23d (B).....Luke Field, H. T. Organizing at March Field.
24th (P).....France Field, C. Z. Organizing at Mitchel Field.
25th (B).....France Field, C. Z. Organizing at Mitchel Field.
26th (A).....Kelly Field. Organizing.
27th (P).....Ellington Field, Tex.
28th (B).....Clark Field, P. I. Organizing at Mather Field.
49th (B).....Ellington Field, Tex. Temp'ly at Langley Field.
50th (O).....Langley Field, Va.
88th (O).....Langley Field, Va. Temp'ly at Godman Field, Ky.
90th (A).....Kelly Field, Tex.
91st (O).....Crissy Field, Calif.
94th (P).....Ellington Field, Tex.
95th (P).....Ellington Field, Tex.
96th (B).....Kelly Field, Tex. Organizing at Langley Field.
99th (O).....Bolling Field, D. C.

PHOTO SECTIONS

No. 1.....Kelly Field, Tex.
No. 2.....Kelly Field, Tex.
No. 3.....Bolling Field, D. C.
No. 4.....Montgomery, Ala.
No. 5.....Chanute Field, Ill.
No. 6.....Clark Field, P. I.
No. 7.....Godman Field, Ky.
No. 8.....Mitchel Field, N. Y.
No. 9.....Ft. Riley, Kans.
No. 11.....Luke Field, H. T.
No. 12.....France Field, C. Z.
No. 14.....Mitchel Field, N. Y.
No. 15.....Crissy Field, Calif.

AIR PARKS

No. 1.....Bolling Field, D. C.
No. 2.....Ellington Field, Tex.
No. 3.....Langley Field, Va.
No. 4.....Kelly Field, Tex.
No. 5.....Kelly Field, Tex.
No. 6.....Mitchel Field, N. Y.
No. 7.....Mitchel Field, N. Y.
No. 8.....France Field, C. Z.
No. 10.....Luke Field, H. T.
No. 11.....Clark Field, P. I.

BALLOON COMPANIES

No. 1.....Ross Field, Calif.
No. 3.....Fort Ruger, H. T.
No. 4.....Brooks Field, Tex.
No. 5.....Brooks Field, Tex.
No. 13.....Ross Field, Calif.
No. 17.....Kindley Field, P. I.
No. 20.....Lee Hall, Va.
No. 21.....Ft. Kamehameha, H. T.
No. 22.....Lee Hall, Va.
No. 23.....Post Field, Okla.
No. 27.....Kindley Field, P. I.

AIRSHIP COMPANIES

No. 8.....Brooks Field, Tex.
No. 9.....Scott Field, Ill. Temp'ly at Omaha.
No. 12.....Scott Field, Ill. Temp'ly at Omaha.
No. 16.....Brooks Field, Tex.
No. 18.....Aberdeen Proving Ground.
No. 19.....Langley Field, Va.

GROUND ESTABLISHMENTS

Flying Fields

Bolling Field .....Anacostia D. C.
Clark Field .....Camp Stotsenburg Pampanga, P. I.
Crissy Field .....San Francisco, Calif.
Douglas Airdrome ....Douglas, Ariz. (Border Patrol)
Ellington Field .....Houston, Tex.
Ft. Bliss Airdrome ....Ft. Bliss, El Paso, Tex.
France Field .....Panama, Canal Zone.
Kelly Field .....San Antonio, Tex.
Kindley Field .....Ft. Mills, Corregidor, P. I.
Langley Field .....Hampton, Va.
Luke Field .....Pearl Harbor, Oahu, H. T.
Mather Field .....Mills, Calif.
Miller Field .....Newdorp, Staten Island, N. Y.
Mitchel Field .....Garden City, Long Island, N. Y.

Balloon Fields

Brooks Field, San Antonio, Tex.
Ft. Kamehameha, Honolulu, H. T.
Ft. Omaha, Neb.
Ft. Ruger, Honolulu, H. T.
Langley Field, Hampton, Va.
Lee Hall, Va.
Ross Field, Arcadia, Fla.

Air Intermediate Depots

Americus, Ga. (Souther Field)
Fairfield, Ohio. (Wilbur Wright Field)
Little Rock, Ark.
Middletown, Pa.
Montgomery, Ala.
Richmond, Va.
Coronado, Calif. (Rockwell Field)
San Antonio, Tex.

Air Reserve Depots

Curtiss-Elmwood A.R.D., Buffalo, N. Y.

Long Island A.R.D., U. S. Aeronautical Engine Plant, Long Island City, N. Y.

Temporary Storage Depots

Arcadia, Fla. (Dorr Field)
Belleville, Ill. (Scott Field)
Hawes, Tex. (Love Field)*
Houston, Tex.
Miami, Fla. (Chapman Field)
Millington, Tenn. (Park Field)
Morrison, Va.
Mount Clemens, Mich. (Selfridge Field)
Waco, Tex. (Rich Field)

*In process of abandonment.

Air Service Schools

Pilot School, Carlstrom Field.
School of Aerial Photography, Langley Field.
Engineering School, McCook Field.
Field Officers School, Langley Field.
Balloon School, Ross Field.
Balloon School, Ft. Omaha.
Airship Pilots School, Langley Field.
A. S. Mechanics School, Chanute Field.

Engineering Division

McCook Field, Dayton, Ohio.

U. S. Naval Aviation

The only permanent air formations of the U. S. Naval Air Service are the Atlantic Fleet Air Force and the Pacific Fleet Air Force, each of which consists of two or three NC seaplanes and twelve F-5-L seaplanes.

U. S. Marine Corps Aviation

The U. S. Marine Corps maintains about a dozen aviation squadrons for service on shore in connection with operations by the U. S. Navy. Several of these squadrons are in Haiti and in Santo Domingo.

France

Army Air Service (Aéronautique Militaire)

Fighting strength: 15 aviation regiments (180 squadrons).
2 balloon regiments. (24 companies).
(No airships.)

Organization: The tactical unit of the aviation arm is the *escadrille* (squadron), consisting of a headquarters and of three sections (flights) of four airplanes each. Four squadrons form a group, and three groups form a regiment. The French aviation regiments therefore consist of 12 squadrons, and are comparable to the Wings of the U. S. Army Air Service, which are however only a war time provision.

The tactical unit of the balloon arm is the company. Four companies form a battalion, and three battalions form a regiment.

The organization of the anti-aircraft regiments is not definitely known, although they are understood to consist of three groups of four batteries each, with four motorized guns per battery. The French anti-aircraft regiment would thus comprise 48 guns.

The French Army Air Service does not operate any airships.

Appropriation

	1921	1922*
Army Air Service	F.74,000,000	F.79,507,180
Naval Air Service	F.33,807,300	F.49,180,093
Civil Air Transport	F.147,000,000	F.154,000,000

*Requested from Parliament.

Stations of French Air Troops

AIR BRIGADES

1st Air Brigade. Hdq. in Paris.
34th Avia. Regt.
2d Bat'n, 1st Ball. Regt.
3d Bat'n 1st Ball. Regt.
1st A.-A. Regt.

2d Air Brigade. Hdq. in Dijon.
32d Avia. Regt.
1st Bat'n, 1st Ball. Regt.
1st Bat'n. 2d Ball. Regt.
4th A.A. Regt.

3d Air Brigade. Hdq. in Lyon.
35th Avia. Regt.
3d Bat'n, 2d Ball. Regt.
5th A.A. Regt.

AVIATION REGIMENTS

1st (Pursuit) .....Thionville (Bas-Rhin).
2d (Pursuit) .....Strasbourg (Haut-Rhin).
3d (Pursuit) .....Chateauroux (Indre).
11th (Day Bombardment) ..Metz (Moselle).
12th (Day Bombardment) ..Neustadt (Palatinate).
13th (Day Bombardment) ..Avor (Cher)
21st (Night Bombardment) ..Nancy (Meuthe-et-Moselle).
22d (Night Bombardment) ..Luxeuil (Haute-Saône).
31st (Observation) .....Tours (Indre-et-Loire).
32d (Observation) .....Dijon (Côte-d'Or).
33d (Observation ..... Mayence, Rhineland.
34th (Observation) .....Le Bourget (Seine).
35th (Observation) .....Lyon (Rhône).
36th (Observation) .....Hussein-Dey, Algeria.
37th (Observation) .....Rabat, Morocco.

BALLOON REGIMENTS

1st....Battalion No. 1.....Epinal (Vosges).
Battalion No. 2.....Compiègne (Oise).
Battalion No. 3.....Paris.
2d ....Battalion No. 1.....Nevers (Nièvre).
Battalion No. 2.....Toulouse (Haute-Garonne).
Battalion No. 3.....Privas.

ANTI-AIRCRAFT REGIMENTS

1st.....Paris.
2d .....Sedan.
3d .....Toul.
4th.....Lure.
5th.....Avigon.

GROUND ESTABLISHMENTS

Central flying school: Istres (Bouches-du-Rhône).
Gunnery and Bombardment School: Cazeau (Gironde).
School of Specialists (Fitters and Riggers): Bordeaux.
First Air Park Group: Dijon.
Central Aircraft Establishment: Chartres.
Balloon and Airship Establishment: Chalais-Meudon (Seine).

Great Britain

Royal Air Force

Fighting strength 32 aviation squadrons.
? balloon companies.
(No airships.)

Personnel: 2,900 officers and 25,000 men.

Organization: The tactical unit of the aviation arm is the squadron, consisting of a headquarters and of three flights of six airplanes each. Three or more squadrons form a *wing* (the American and French *group*), and three or more wings form a *group* (the American wing, or the French regiment).

No information is available regarding the organization and number of balloon companies.

Appropriation:

	1920-21	1921-22
Royal Air Force	£22,992,230	£19,033,400
Civil Air Transport		£ 1,000,000

Stations of British Air Troops

NOTE:—The R.A.F. squadrons stationed in Great Britain and Ireland are apparently formed into four Groups, two of which are stationed in the Inland Area, and two (Nos. 10 and 29) in the Coastal Area. The latter Groups are formed of seaplane squadrons. As no reliable information is available on said organization, the squadrons known to exist, with their stations, as far as known, are given below.

INLAND AREA

No. 2 Sq.....Fermoy.
No. 4 Sq.....Ireland.
No. 24 Sq.....Station unknown.
No. 25. Sq.....Hawkinge.
No. 39 Sq.....Spittlegate.

COASTAL AREA

No. 3 Sq.....Leuchars, Fifeshire.
No. 201 Sq.....Station unknown.
No. 203 Sq.....Donibristle, Edinburgh.
No. 205 Sq.....Leuchars, Fifeshire.
No. 207 Sq.....Bircham Newton.
No. 210 Sq.....Gosport.
No. 230 Sq.....Station unknown.

RHINELAND

No. 12 Sq.....Bickendorf, Cologne.

MALTA

No. 267 Sq.....La Valetta.

EGYPT GROUP

Hdq. Heliopolis, Egypt.
No. 1 Egypt Wing.....Hdq. Heliopolis.
No. 14 Sq.....Ramleh.
No. 45 Sq.....Almaza.
No. 2 Egypt Wing....Hdq. Abu Sueir.
No. 208 Sq.....Abu Sueir.
No. 216 Sq.....Heliopolis
Flying Training School No. 4, Abu Sueir.
Aircraft Depot.
Aircraft Park.

No. 48 Sq.....Station unknown.
No. 56 Sq.....Station unknown.

IRAQ GROUP

Hdq. Bagdad, Mesopotamia.
No. 1 Sq.....Hinaidi.
No. 8 Sq.....Bagdad.
No. 47 Sq.....(?)
No. 55 Sq.....Mosul.
No. 84 Sq.....(?)

INDIAN GROUP

Hdq. Ambala, India
No. 1 Indian Wing, Hdq. Peshawar.
No. 20 Sq.....Kohat.
No. 31 Sq.....Peshawar.
No. 2 Indian Wing, Hdq. Ambala.
No. 28 Sq.....Ambala.
R.A.F. School....Ambala.
No. 3 Indian Wing. Hdq. Quetta.
No. 5 Sq.....Quetta.
No. 4 Indian Wing. Hdq. Risalpur.
No. 27 Sq.....Risalpur.
No. 60.....Risalpur.
Aircraft Depot, Karachi.
Aircraft Park, Lahore.

GROUND ESTABLISHMENTS

Central Flying School: Upavon, Wiltshire.
Flying Training Schools.
No. 1....Netheravon.
No. 2....Inland Area.
No. 3....Digby.
No. 4....Abu Sueir, Egypt.
No. 5....Shotwick, Cheshire.
No. 6....Manston, Kent.
Air Pilotage School.
Armament and Gunnery School
Electrical and Wireless School.
School of Balloon Training: Rolleston.
School of Army Cooperation.
School of Fleet Cooperation.
Cadet College: Cranwell.
Royal Aircraft Establishment: South Farnborough.
Airplane Experimental Establishment: Martlesham Heath.
Stores Depots.
No. 1....Kidbrooke.
No. 2....Uxbridge.
No. 3....Milton.
No. 4....Ruislip, Ickenham.

Italy

No trustworthy information is available regarding the organization of the Italian Air Services. The Army Air Service is believed to consist of about a dozen airplane squadrons and of a few balloon companies.

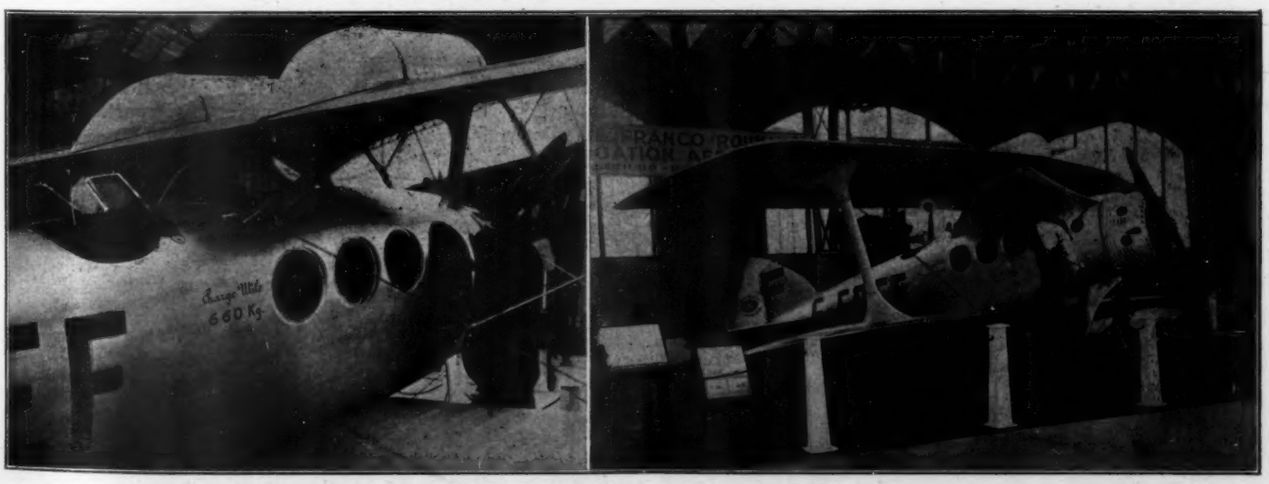
The known air estimates for the fiscal year 1921-22 are as follows:

Army Air Service .....L. 42,700,000
Civil Air Transport .....L 22,060,000

Japan

The Japanese Air Services are still in the formative stage. The Army Air Service is being trained by French air officers, while British air officers are organizing the Naval Air Service.

No information regarding either organization or appropriations is available.



TWO VIEWS OF THE SPAD S-33 COMMERCIAL SIX-SEATER (250 HP. SALMSON) AT THE PRAGUE AERO SHOW
Photo International

The American Legion Flying Meet

L. Bertaud on Ansaldo-Curtiss Wins Legion Derby
C. S. Jones on C-6 Oriole Wins Legion Junior Derby

The flying meet held Oct. 31 to Nov. 2 in connection with the Third Annual American Legion Convention at Kansas City, Mo., was a demonstration of high educational value, beside being a huge success. In the three days of the meeting a total of about 50,000 miles was flown, and more than 3,000 passengers carried, without an accident of any importance. The chief event of the meet, the American Legion Derby, was won by Lloyd Bertaud on an Ansaldo "Balilla" fitted with the 400 hp. Curtiss K-12 engine. The Derby is to be made a permanent fixture of the American Legion Conventions, and the trophy which goes to the winner must be won three times in succession before becoming the permanent possession of a pilot.

THE ANSALDO "BALILLA" AS FITTED WITH THE 400 HP. CURTISS K-12 ENGINE. LLOYD BERTAUD, WINNER OF THE AMERICAN LEGION DERBY, IS IN THE COCKPIT

Following are the performances made in the various events of the American Legion flying meet:

Altitude Tests

There were four kinds of altitude tests on the program: absolute altitude flights for single-seaters and for two-seaters, and altitude parachute jumps for men and women.

The altitude test for single-seaters was won by Paul D. Wilson on a Thomas-Morse MB-3 (300 hp. Wright engine) with 22,350 ft.

The altitude test for two-seaters was won by Lt. Wendell Brookley, A. S., on a DH-4B (400 hp. Liberty), who reached 24,850 ft. with Sergt. Encil Chambers as passenger. The latter won in the same flight the altitude parachute jumping contest by chuting from the maximum altitude reached. The duration of his descent was 18 minutes.

Efficiency Contest of Sport Airplanes

In this contest a sport airplane was defined as one with an open cockpit capable of carrying one or two passengers and their baggage in addition to the pilot. In judging such a type, speed, rate of climb, ease in landing, maneuverability, and the accessibility of all vital parts was considered. Points were awarded for the fastest time for one lap of the course, for the shortest take-off, for the shortest landing run, and for accessibility.

This contest was won by Earle F. White on a SVA-9 (225 hp. SPA engine). Paul D. Wilson on a Thomas-Morse S-6 (80 hp. Le Rhone engine) was second, and D. H. Robertson on a Farman Sport (60 hp. Le Rhone) was third. In view of the excellent flying record made throughout the meet by the Farman Sport, a special award of $500 was granted this machine.

Relay Race

This event was devised to test primarily the ability of the entrants and not fundamentally the performance of the machine, and for this reason the contest was restricted to airplanes of one class, whose flying speeds vary but slightly, namely Curtiss "Jennies" and "Canucks".

The race was flown over a triangular course of five miles in the following manner. Each team was made up of four airplanes, and each machine must fly one lap after which it must land in the area restricted to landings, stopping within 10 ft. of a white line on the field. As each ship lands an assistant starter drops a red flag, whereupon the next ship of the team takes off from the starting place. If an airplane overshoots the line, the pilot must wait until the ships then in the air have landed before he can turn and taxi back to within the required distance from the white line. It will be seen from this outline that accuracy in landing is an important factor in the determination of the winner.

The relay race was won by the Red Team, made up of E. D. Barnes, Earle Smiley, J. H. Smith, and R. L. Wagner, all flying Curtiss JN-4D machines.

Legion Junior Derby

The Legion Junior Derby was open to any type of airplane having a maximum horizontal speed of less than 100 m.p.h., and the race was run around a triangular course of 17.1 miles which had to be covered fives times. The total distance was thus 87.5 miles, and the winner had to cover it in the shortest time of all contestants.

The entrants for this contest included the following types: Curtiss Oriole and JN-H, Laird Swallow, Lincoln Standard, Longren H.2 and A.K., and the Sport Farman.

The race was won by C. S. Jones on a Curtiss Oriole (C-6 engine) at an average speed of 97.3 m.p.h.

Looping Contest

This contest which was for the greatest number of loops that can be seen and counted, was won by N. D. Trindler on a Longren A.K. (60 hp. Lawrance L-2 engine)' with 38 loops. Buck Weaver and Walter Beach, both on Laird machines, were second and third, respectively.

American Legion Derby

The American Legion Derby, which was competed for at Kansas City for the first time, was open to any type of airplane, the winner to be the pilot who completed a 175-mile course in the shortest elapsed time. The race was run in ten laps around a triangular course of 17.5 miles.

Following are the results of this race:

First: Lloyd Bertaud on Ansaldo Balilla (400 hp. Curtiss) in 60 min. 15 2/5 sec.

Second: Lt. J. D. Givens on DH-4B (400 hp. Liberty) in 66 min. 15 3/5 sec.

Third: Earle F. White on SVA-6 (150 hp. Spa) in 67 min. 7 4/5 sec.

The Aviation Meeting at Omaha

Acosta on Curtiss-Navy Racer Wins Pulitzer Race
Earle F. White on SVA-9 Wins Larsen Trophy

The aviation meeting held in connection with the International Aero Congress at Omaha, Nov. 3, 4 and 5, had as its main attraction the second annual contest for the Pulitzer Trophy. This trophy was donated by Ralph Pulitzer for the purpose of giving encouragement to the development of racing airplanes, hence the contest is a free for all race.

Conditions of the Contest

The conditions of the second contest state that competing airplanes must have a safety factor of 7.5 in the case of monoplanes, and of 6 in the case of biplanes; an air speed in excess of 140 m.p.h. as loaded for start of race; and a visibility and maneuverability which in the opinion of the contest committee is not a menace to other contestants or spectators.

The course for the contest was triangular, and of a length of 30.7 miles, which the contestants had to cover five times. The total length was thus 153.5 miles.

The following were the rules of the race.

(a) Pilots must hold a straight course after starting, until they have gone the distance to be specified and marked.

(b) A plane overtaken must hold its altitude and a true course, in order that it may not in any way impede or interfere with a faster overtaking plane.

(c) A plane overtaking a slower plane shall never pass or attempt to pass between that plane and any pylon or captive balloon marking a turning point.

(d) After crossing the finishing line, all planes shall continue on their course until they have attained the altitude of 2,000 ft., then they may turn and return to the field, and land in that part of the field assigned for landing and in so doing shall not cross the course or finish line.

(e) Pilots shall pass all turning points in plain view of the observing officials stationed at each turning point and at an altitude of not over 500 ft.

The winner of the contest is the pilot who completes the full course in the shortest elapsed time, and second place, the second best time, etc., provided the pilot is not disqualified. All contestants are required to hold an aviators license issued by the International Aeronautical Federation, and to be entered upon the competitors' register of the Aero Club of America.

Contestants were cautioned against "doping" the fuel with picric acid ether, or similar high explosive liquids.

The following cash prizes were offered to the contestants: winner, $3000; second place, $2000; third place, $1000.

The Machines Entered

Following is a list of the machines entered in the Pulitzer Trophy race:

*TYPE	MAKE	ENGINE	PILOT
T	Curtiss "Cox"	435 hp. Curtiss C-12	Clarence Coombs
B	Curtiss "Navy"	405 hp. Curtiss CD-12	Bert Acosta
B	Ansaldo "Balilla"	400 hp. Curtiss C-12	Lloyd Bertaud
B	Thomas-Morse MB-6	300 hp. Wright	Capt. J. A. MacReady
M	Thomas-Morse MB-7	300 hp. Wright	Lt. Col. H. E. Hartney
B	SVA-9	225 hp. S.P.A.	James Curran

*T, triplane; B, biplane; M, monoplane.

THE CURTISS-COX ("CACTUS KITTEN") RACER ON WHICH CLARENCE COOMBS FINISHED SECOND IN THE PULITZER RACE. THE PHOTOGRAPH SHOWS BERT ACOSTA IN THE COCKPIT

The Curtiss Navy Racer was built during 1921 on Navy order for the purpose of using it in such contests as the Pulitzer Trophy Race, with the idea that motors in competition contribute greatly to the knowledge of the Naval Air Service with regard to the possibility of their use for military purposes, and due to the fact that when engineers go about to conceive and produce a racing type of machine, they generally make considerable advances in the art useful for military pursuit types.

The Curtiss Navy Racer was conceived about the first of June, 1921, and one machine was completed ready to fly on August 1, 1921; another machine, exactly similar, was finished August 8, 1921. These machines were first flown early in August with Bert Acosta as pilot, at the Curtiss Field, Mineola, and it was found that the expectations of the designers were pretty well realized. The flight tests were made by Mr. Acosta and Lieutenant Bradley, of the U. S. Marine Corps, during August and September and the early part of October. When it was definitely decided that the Navy and Army Air Services would not compete for the Pulitzer Trophy in the Race at Omaha, the Curtiss Aeroplane & Motor Corporation requested the loan of one of the Navy Racers for the competition, which loan was granted by the Navy Department.

The Curtiss Navy Racer is equipped with a Curtiss CD-12 motor of 405 h. p., the letters CD standing for "Model C direct drive," as the standard Model C-12 is a geared engine.

SPECIFICATIONS OF THE CURTISS NAVY RACER

DIMENSIONS	
Span (overall)	22 ft. 8 in.
Length	21 ft. 0½ in.
Height	8 ft. 11 in.
Length upper panel	22 ft. 8 in.
Length each lower panel	10 ft. 2¼ in.
Chord (all wing)	48 in.
Angle of incidence	0 °
Gap	48 in.
Stagger	15 in.
Dihedral (lower only)	2 °
Sweepback	None
Tread of wheels	60 in.
Distance L.E. lower to C.G. (full)	7.76 in.
Distance L.E. lower to C.G. (empty)	2.56 in.
(See Rept. No. 1958 for details)	
Distance L.E. lower to elev. hinges	14 ft. 2 in.
Distance L.E. lower to rudder	14 ft. 7½ in.
HORSEPOWER	
The Curtiss Model CD:12 400 hp. at 2000 r.p.m.	
AREAS	
Wing Area	
Upper wing panel	88.0 sq. ft.
Lower wing panels without Ailerons	80.0 sq. ft.
Total wing area	168.0 sq. ft.
Control Surface Areas	
Ailerons	18.0 sq. ft.
Horizontal stabilizer (2)	12.60
Elevator (2)	9.20
Tail fin (1)	4.80
Skid fin	00
Rudder (1)	4.80
Unit Loadings	
Lbs. per hp.	5.24
Lbs. per sq. ft.	12.5
Wing section	Sloane
Performance	
High speed (est.)	190 m.p.h.
Low speed	70 m.p.h.
Light weight	1735 lb.
Useful load	430 lb.
Gross weight	2165 lb.
Lamblin radiators	

The Curtiss "Cox" Racer, designed and built by the Curtiss Aeroplane & Motor Corp., is of triplane construction, and is equipped with Curtiss-12 435 hp. geared motor. The machine was constructed on order of S. F. J. Cox, of Houston, Tex., and was flown for him with Clarence Coombs as pilot in the Pulitzer 1921 contest. It was tested early in October at the Curtiss Flying Field, Mineola, L. I., with Bert Acosta as pilot, and in its test flights showed remarkable speed, even in excess of that made by the Curtiss-Navy Racer.

SPECIFICATIONS OF CURTISS-COX RACER

Wing arrangement	Triplane
Span	20 ft.
Length overall	19 ft. 3 in.
Height overall	8 ft. 6 in.
Total area	175 sq. ft.
Gross weight	2406 lb.
Load per sq. ft.	13.75 lb.
Load per hp.	5.53 lb.
Useful load	470 lb.
Gasoline capacity	40 gal.
Range wide open	1 hr. 10 min.
Max. indicated speed at sea level	196 m.p.h.
Landing speed at sea level	70 m. p.h.
Motor	C-12
Hp. at 2250 r.p.m.	435
Gasoline consumption	.5 per hp. hr.

Mr. Cox also entered in the Pulitzer race the Curtiss "Texas Wildcat", which was designed for the 1920 Gordon Bennett race, but this machine was ruled out by the Contest Committee of the Aero Club of Omaha on account of its unduly high landing speed. The Texas Wildcat is identical in construction with the Curtiss Cox racer, except that in the latter the landing speed has been considerably reduced by the supplementary wing area secured by converting the machine into a triplane.

SPECIFICATIONS OF THE CURTISS "TEXAS WILDCAT"

Wing arrangement	
Span	26 ft.
Length overall	19 ft. 3 in.
Height overall	8 ft. 6 in.
Total area	90 sq. ft.
Gross weight	2300 lb.
Load per sq. ft.	25.5 lb.
Load per hp.	5.3 lb.
Useful load	470 lb.
Gasoline capacity	40 gal.
Range wide open	1 hr. 10 min.
Max. indicated speed at sea level	215 m.p.h. Estimated approx.
Landing speed at sea level	95.5 m.p.h.
Motor	C-12
Hp. at 2250 r.p.m.	435
Gasoline consumption	.5 per hp. hr.

The Ansaldo "Balilla" entered in the Pulitzer race is the same machine which won third place in last year's competition for the Pulitzer race, except that it then had a 220 S. P. A. engine, whereas this year it was fitted with the 400 hp. Curtiss model K-12 engine. The machine was entered by the Aero Import Corp. of New York, American Agents for Ansaldo and SVA airplanes.

By cutting the original fuel capacity of 45 gal. to 33 gal., and by the suppression of the armament it became possible to turn out the machine as she stands with an increase in weight, ready for flight, of less than 200 lb., or about one pound per square foot of wing area. The climb with the Curtiss K-12 engine is over 2500 feet in the first minute off the ground at sea level.

The SVA-9 was entered by the Ralph Diggins Co. This machine does not differ materially from the well known stock model.

SPECIFICATIONS OF THE ANSALDO BALILLA WITH CURTISS K-12 ENGINE

Wing arrangement	Biplane
Span	26 ft. (approx.)
Length overall	22 ft. 6 in. (approx.)
Height overall	9 ft. (approx.)
Total area	225 sq. ft. (approx.)
Gross weight	2367 lb.
Load per sq. ft	10.5 lb.
Load per hp.	5.9 lb.
Useful load	544 lb.
Gasoline capacity	50 gal.
Range wide open	1½ hr.
Maximum indicated speed at sea level	170 m.p.h. (estimated)
Landing speed at sea level	61 m.p.h. (estimated)
Motor	Curtiss K-12
Hp. at 2250 r.p.m.	400
Gasoline consumption	.5 per hp. hr.

The Thomas-Morse MB-6 is a modification of the well known MB-3 single seater pursuit machine, while the MB-7 is the semi-cantilever monoplane which was recently tested at Ithaca, N.Y., by Col. H. E. Hartney.

SPECIFICATIONS OF THOMAS-MORSE MB-7

Span	24 ft.
Overall length	18 ft. 6 in.
Maximum height	7 ft. 5 in.
Chord	5 ft. 6 in.
Total wing area	112 sq. ft.
Engine	320 hp. Wright
Propeller	8 ft. 2 in. dia.
Weight loaded	1975 lb.
Wing loading	17.6 lb.-sq. ft.
Power loading	4.95 lb.-hp.

The Race

The day of the race, Nov. 3, was all any speed pilot could ask. The sun shone, the atmosphere was clear with splendid visibility and a ground temperature of 48 deg. A mild breeze, too light to affect the starting, blew throughout the afternoon.

Bert Acosta in the toss-up won the privilege of starting first. He crossed a starting line at a terrific speed, estimated at more than 200 miles an hour and was out of sight behind the hills in a moment.

Lloyd W. Bertaud of New York, in the Ansaldo Balilla followed Acosta three minutes later. Bertaud flew high, whereas Acosta barely skimmed the line of trees on the hill.

The third man out was Clarence Coombs, driving a Cactus Kitten, as the Curtiss Cox racer is also called. The machine was painted bright red and was the favorite with the crowd. When Coombs crossed the line getting the very limit of speed from his machine he was cheered by the spectators.

Before Coombs had got out of sight Acosta was back, having covered the first thirty-mile lap of the race in 9 min. 40 sec. He was off again on the second lap before the fourth and fifth men took the air.

Col. Hartney was scheduled to follow Coombs, but because of trouble with his gasoline pump, gave place to James Curran of Chicago, in the SVA-9. He and Capt. J. A. MacReady of New York, flying the Thomas-Morse MB-6 were sent into the race.

For the next forty-five minutes the air was full of racing airplanes. At times as many as three were coming down the course at the same time.

On the third lap Curran was forced down and made a perfect landing in the field. Engine trouble had developed and he was out of the race.

From the start the race was between Acosta and Coombs. The latter's machine, the "Cactus Kitten", gained on straightaway, while Acosta made his gains on the turns. The Kitten is however reported to have "lost a stay" and Coombs was unable to make quick turns.

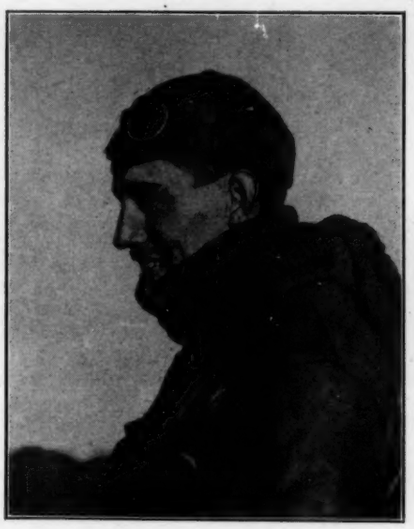
Having finished his fourth lap, Acosta landed very smoothly, although at fairly high speed. His time for the 153.5 miles was 52 min, 9.2 sec., which gives an average speed of 176.7 m.p.h., as against 173.1 m.p.h for the best speed made in the Deutsch de la Meurthe Cup Race, and 168.4 m.p.h. made in the last Gordon Bennett Cup.

Clarence Coombs finished second, Lieutenant MacReady third, and Lloyd Bertaud fourth, as shown below.

1st: Bert Acosta (Curtiss-Navy) in 52 min. 9 3-5 sec. 176.7 m.p.h.

2nd: Clarence Coombs (Curtiss-Cox), 54 min. 7 3-5 sec. 170.26 m.p.h.

CLARENCE COOMBS, PILOT OF THE CURTISS-COX RACER



BERT ACOSTA, PILOT OF THE CURTISS-NAVY RACER

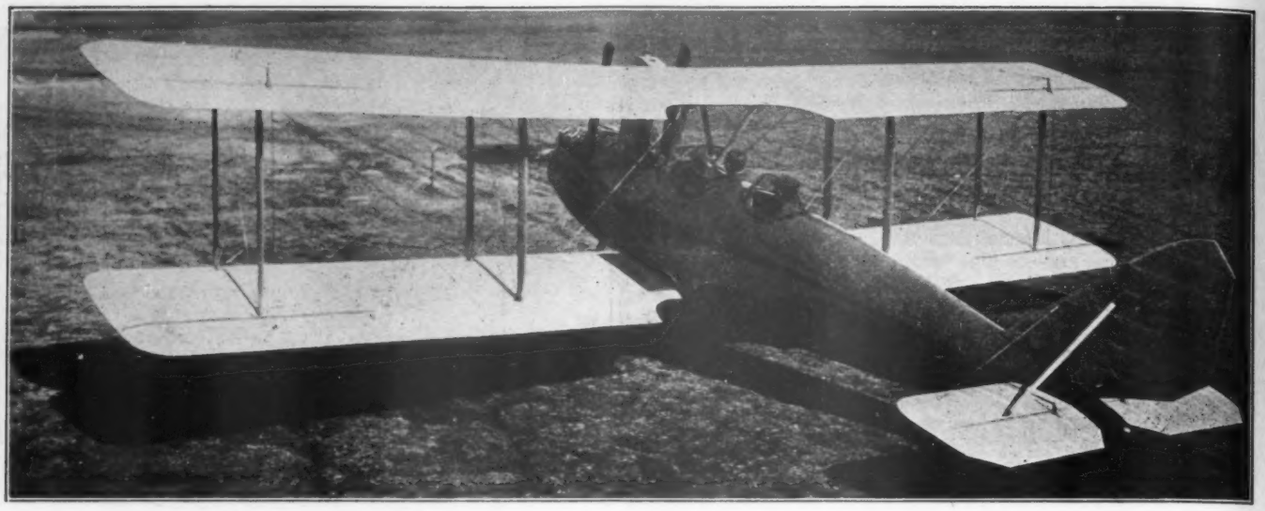
3rd: Lt. J. MacReady (Thomas-Morse) in 57 min. 20 3-5 sec. 160.71 m.p.h.

4th: Lloyd Bertaud (Ansaldo-Curtiss) 61 min. 31 3-5 sec. 149.78 m.p.h.

For the sake of comparison, and also because erroneous reports attributed to the winner of last year's Pulitzer Race an average speed of 176 m.p.h., it is worth while noting that Pilot Acosta's performance establishes a new world's speed record as flown in competition. The winner of the 1920 Pulitzer Race Capt. C. C. Moseley, who piloted a Verville-Packard 600 hp. racer was first credited with having made an average speed of 176 m.p.h., and with having broken all racing speed records, when as a matter of fact his actual speed was only 156.5 m.p.h. The error in computing his speed arose from the fact that the course originally selected on Long Island was to have been 132 miles in length, and kite balloons were to mark the turning points. As the kite balloons were not delivered in time for the race the nearest prominent land marks had to be selected, and when the Geodetic Survey subsequently determined the length of the course it was found to be 29.02 miles, or for the four laps covered a total distance of 116.08 miles. This explains the discrepancy between the two speed figures.

Returning to the 1921 race, when all the other entrants had either completed the course, or were on the ground, Colonel Hartney was endeavoring to get his MB-7 in flying condition. Trouble with a gasoline pump had so far delayed his start, but after some strenuous efforts on the part of his mechanics Colonel Hartney finally took off. It was a last minute start, as the Contest Committee had given him twenty minutes in which to be off.

With two minutes to spare, Hartney crossed the line. He should have made the first lap in about 10 minutes, so that when 15 minutes passed and the MB-7 had not returned, anxiety became intense. Five minutes later various airplanes were made ready to start out in order to find out what had happened to the missing machine, when a farmer on the course telephoned in that an airplane had come to the ground near Loveland, Iowa, and that the pilot was injured. Assistance from the nearest relief station was rushed to Hartney, who was carried to a farmhouse and treated by a physician. He was found to be severely injured, having suffered a fracture of the hip and internal injuries. According to the Omaha Hospital surgeons Colonel Hartney is not in danger and he will recover, although this may take two months.



A Curtiss Oriole (90 Hp. OX-5)—The Type which Triumphed both at Kansas City and at Omaha over Numerous Contestants

Souvenir hunters from a nearby town rushed to the scene and some one dropped a match into the wrecked airplane. The machine was completely burned.

Hartney explained his gasoline pump had failed to function and that when he attempted to change to his emergency supply, the switch stuck. He nose-dived to the ground.

It appears that the pump which broke down was not the standard pump supplied by the Wright Aeronautical Corp. on their Wright engines, but one produced by McCook Field.

Almost at the same time Harry Eibe of Chicago, parachute jumper, was drowned when his parachute alighted in the Missouri River. He could not swim and sank before the only boat in sight could be broken from its lock and chain fastenings and go to his rescue.

Next year's Pulitzer Race is to be flown at Detroit. The flying club of that city was to have held the race this year, but gave it up because it received no assistance from the army or the navy and was fearful it would not get enough entries to make the event interesting.

Some Notes on the Machines

In the trials before the machines were shipped west the Curtis-Cox triplane racer showed—as was said before—speed in excess of the Curtiss-Navy biplane. That Bert Acosta on the Curtiss-Navy won the race in the opinion of observers was due to the fact that Clarence Coombs had never flown the triplane until he stepped into the cockpit for the race and consequently flew more cautiously than Acosta. Both of these ships have made straightaway speeds in excess of 200 m.p.h. when flown on Long Island before the race by Bert Acosta. The Curtiss Company intends to conduct official speed trials over an accurately measured course in the near future in an effort to exceed the world's straightaway speed record.

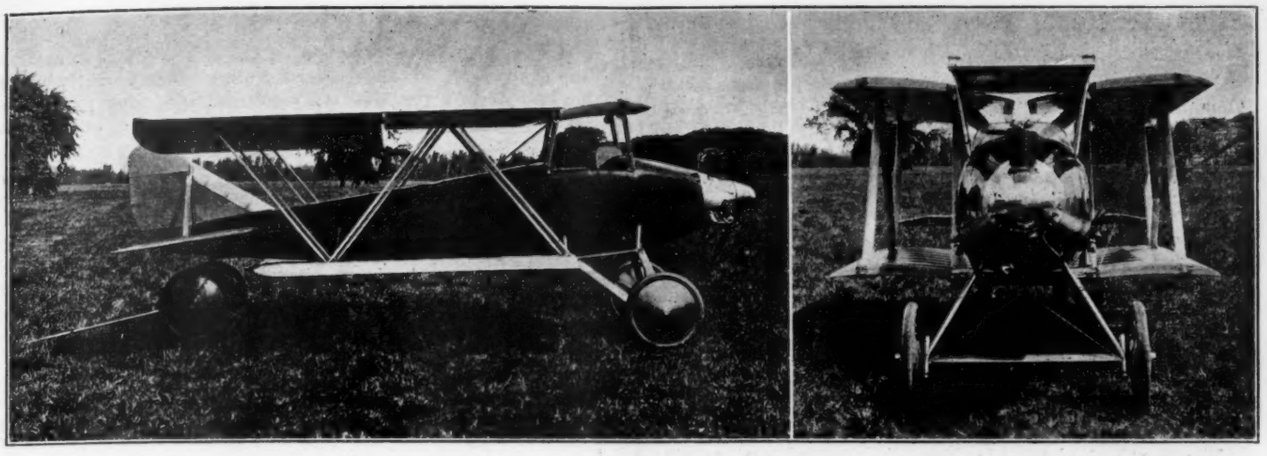
An outstanding feature of the speed events at Kansas City and Omaha was the magnificent showing of the Curtiss engines. The C-6 in an Oriole piloted by Casey Jones won the Junior Legion Derby at the rate of 97.3 m.p.h. The K-12 in the SVA Balilla piloted by Lloyd Bertaud won the Legion Derby. A C-D-12 (direct Drive) in the Navy Curtiss biplane piloted by Bert Acosta won the Pulitzer Race with an average speed of 176.7 m.p.h., a world's record for speed in competition over a circular course. Kirsch's average speed in the Deutsch race, the new French speed classic, having been 173.1 m.p.h. Then Clarence Coombs in the Curtiss-Cox triplane with the C-12 engine secured second place in the Pulitzer race with a speed of 170.75 m.p.h., while Bertaud in the SVA Balilla with the K-12 engine secured fourth place.

The accessories used on the Curtiss engines in the speed events at Omaha and Kansas City were:

MACHINE	MOTOR	MAGNETOS	SPARK PLUGS	CARBURETORS
Oriole	C-6	Splitdorf	AC	Zenith
SVA Balilla	K-12	Berkshire	AC	Ball & Ball
Curtiss Navy Racer	CD-12	Berkshire	AC	Ball & Ball
Curtiss-Cox Racer (Cactus Kitten)	C-12	Berkshire	AC	Ball & Ball

The Oriole piloted by Casey Jones which won the Junior American Legion Derby at Kansas City was flown by pilot

SVA-9 Two-Seater (220 Hp. SPA)—The Type which Won the Larsen Aerial Efficiency Trophy at Omaha, and Efficiency Contest for Sport Airplanes at Kansas City



THE LONGREN TWO-SEATER, WITH WINGS FOLDED, WHICH WON THE ACROBATIC CONTEST AT OMAHA

Jones from Mineola, L I., and after competing at Kansas City flew to the International Aero Congress at Omaha where it performed in several of the events. From the time it left Mineola until the conclusion of the meets the C-6 engine required no attention whatever. The performance of the K-12 in the Balilla was equally noteworthy.

On the morning of Nov. 2 the Balilla won the Legion Derby at Kansas City; on the 3rd it flew to Omaha and in the afternoon of the same day competed in the Pulitzer Race winning fourth place, and finishing in perfect condition.

Free-For-All Races, Nov. 4

On the day after the Pulitzer Trophy race, Nov. 4, two free-for-all races were held over a distance of 90 miles, the course being about 30 miles long, which the contestants had to cover three times. One of these races was limited to C-6 and K-6 Orioles, "Hisso Jennies", Laird Swallows, C-6 and K-6 Standards, and in general to machines with a high speed of from 75 to 90 m.p.h. The other race, over the same course and distance, was restricted to Jennies, Canucks, OX-Orioles, OX-Standards, and similar machines with a high speed of from 60 to 75 m.p.h.

The "75-90 m.p.h. race" was won by C. S. Jones on a C-6 Oriole in 55 min. 44 sec., the same machine and the same pilot who won the American Legion Junior Derby at Kansas City. N. C. Torstensen, on a K-6 Oriole, finished second in 57 min. 4 sec, and R. S. Miller, also on a K-6 Oriole, was third in 59 min. 57 sec.

The "60-75 m.p.h. race" was won by F. M. Donaldson on an OX-Oriole in 69 min. 4 sec. C. S. Jones, also on an OX-Oriole, was second in 69 min. 20 sec., and Harry Buff, on a Longren H-2, finished third in 72 min. 35 sec.

It may be seen that altogether it was a walk-over for the Curtiss airplanes.

The Larsen Efficiency Trophy Contest

Nov. 5, the last day of the Omaha meet witnessed the contest for the aerial efficiency trophy donated by John M. Larsen The conditions governing this contest were laid down by the donor of the trophy in a letter to the Aero Club of America which was reproduced in our issue for Oct. 24, last. According to these stipulations the winning machine would be the one which demonstrates the highest efficiency factor (E) according to the formula

$$E = \left(\frac{W - T}{G}\right) S$$

in which W is the total weight of the airplane leaving the ground, T is the weight of the airplane minus gasoline, oil and water, G is the number of gallons of gasoline consumed in flight, and S is the average speed in miles per hour made over the course.

The Contest Committee of Aero Club of Omaha, under whose auspices the contest was held, further specified that the entries must have a minimum air speed of 60 m.p.h., carry a pay load of at least 400 lb., and have a safety factor of 5 in the case of monoplanes, and of 4 in the case of biplanes, as loaded for the contest. The course of the contest, of an approximate length of 250 miles, was laid out in the form of a round trip from Ak-Sar-Ben Field, Omaha, to Des Moines, Iowa, and return. After crossing the finishing line, the entrants were to continue on their course, and climb to an altitude of 5000 ft. marked by a kite balloon, after which they were to return to the field and land in the space allotted to them.

The entries received for this contest were as follows:

3 Laird Swallows (E. M. Laird Co.)
3 JL-6's (J. L. Aircraft Corp.)
1 Ansaldo A300C (Aero Import Corp.)
1 OX-Oriole (Curtiss Aeroplane & Motor Corp.)
1 Ansaldo Balilla (Lutz-Manor Co.)
1 Gephart Monoplane (V. Gephart Co.)
1 HZB Monoplane (Harding, Zook & Bahl.)
1 Bellanca CF (Omaha Aircraft Co.)
1 Ashmussen Blue Bird (Ashmussen Aircraft Co.)
1 SVA-9 (Ralph Diggins Co.)
1 OX-Oriole (Donaldson Bros.)
1 Miller Biplane (H. S. Miller.)
1 SVA-9 (C. B. Wrightsman.)
1 Fokker F3 (Netherlands Aircraft Corp.)

The contest for the Larsen Trophy was won by Earle F. White on the SVA-9 (220 hp. SPA) which was entered by C. B. Wrightsman of Tulsa, Okla., distributor of Ansaldo aircraft for Texas, Oklahoma and Missouri.

The original announcement issued by the Contest Committee credited this machine with a score of 4748 points, for having carried a total useful load of 1160 lb. at an average speed of 95.17 m.p.h. with a total fuel consumption of 23.25 gal. As a result of a protest filed by Mr. Larsen, donor of the trophy and entrant in the contest, on the ground that the specific gravity of the gasoline used by the SVA-9 was greater than that used by the two Larsen entries which were given second and third place with 4430 and 4218 points, respectively, the Contest Committee ordered a re-checking of all figures. As a result of this revision the number of points allotted to the three machines was somewhat modified, for the higher specific gravity of the gasoline used by the SVA-9 gave that machine a greater useful load, although at the same time it also increased its fuel consumption. The revision count gives the following standing:

1st: Earle F. White on SVA-9 (4671 points).
2d: Max Goodenough on JL-6 (4640 points).
3d: Eddie Stinson on JL-6 (4212 points).

The original figures credited the JL-6 which finished second with having carried 1640 lb. of useful load at an average speed of 97.21 m.p.h. with a fuel consumption of 36 gal., while the JL-6 piloted by Eddie Stinson was given credit for having carried a useful load of 1620.5 lb. at an average speed of 97.66 m.p.h. with a fuel consumption of 37.5 gal. The revised

figures on these items are not available at the time of going to press.

Following the announcement of the revised count Mr. Larsen has taken out an injunction to prevent the Aero Club of Omaha from paying the winner the $3,000 cash prize which goes with the award of the Larsen Trophy. The injunction is based on the alleged use, by the SVA-9 of the center section fuel tank, which was forbidden during the contest according to the regulations.

The last event of the Omaha meet was an acrobatic contest, points being given for Immelmann turns, barrel rolls, falling leaves, loops, vertical reversements and tail spins. No stunting was allowed under 750 ft. altitude.

This contest was won by N. D. Trindler on a Longren AK biplane. Dean Smith finished second, and Eddie Dietz took third place.

The South African Air Force

The South African Air Force, with headquarters at the Swartkops Flying Station, Pretoria, has two hangars, six machines and six trained pilots. There are at Pretoria now eighty commandants from various parts of the Union undergoing military training, and they are taking a great interest in the air depot. They were agreeably surprised when it was explained to them that 112 airplanes with every sort of spares and equipment had been made a free gift to the S.A. Air Force.

A committee under the Minister of Defence will soon select additional personnel. They have already had 1,500 applications for the ten flying officer appointments, and 10,000 applications for enlistment.

Commissions, which are for three years, and may then be renewed, are available from the ranks. The selected candidates will receive six months' training at a military establishment, six months at the air depot, six months at a flying station and six months actually learning to fly. Pilots must be between 18 and 30 years of age.

In addition to Pretoria, there will be stations at Bloemfontein and Maritzburg. It is proposed to use aircraft in cooperation with the police in the Transkei and Swaziland.

Aerial Police in Dallas, Tex.

A flying police squadron recently organized among commercial and professional aviators in Dallas, Tex., was recently made an official branch of the Dallas Auxiliary Police department when the pilots were sworn in by Police Commisioner Louis Turley.

Mayor Aldredge, the city commissioners, Police Chief Strait, and several thousand men, women and children turned out to witness the event which was featured by a review of flying squadron and exhibition aeronautics at the west end of the Oak Cliff viaduct.

The ten airplanes which will compose Dallas' flying police squadron were lined up for inspection and a movie cameraman. Three of them operate from the Oak Cliff field the others having been flown over from Love Field. They were piloted by Lieut. H. W. McGraw, who brought his wife with him as a passenger; Lieut. C. H. Howard with Jeff Still, mechanican; Capt. S. C. Coon, H. C. Foster with Dillard Hamilton, mechanician; J. L. Schroeder, G. G. Lamkin, R. W. Vollum, Maj. W. B. Atwell and J. L. Moran with Jack Killingsworth mechanician.

Book Review

THE GERMAN AIR FORCE IN THE GREAT WAR. Compiled by Major George Paul Neumann. (George H. Doran Co., New York.)

This book is based on the records of twenty-nine officers and officials of the naval and military air service and is therefore one of the most valuable documents that has thus far come out of Germany. The illustrations, thirty-five in number, show every phase of aerial activity. Valuable new material is set forth in detail and many official secrets are released for the first time. The closing chapter gives the German viewpoint on the future of the aircraft.

Air Mail Performance Improved

The report of performance of the Air Mail Service from July 1 to Sept. 30, 1921, shows a percentage of 98, which is the best record for one complete quarter since the service was established. The performance of the entire service was as follows:

"Percentage of performance 98 per cent; number of miles flown with mail 391,018; number of letters advanced 10,014,280. The performance by Divisions: New York-Chicago 98.5 per cent; Chicago-Rock Springs 97.6 per cent; Rock Springs-San Francisco 98 per cent.

"In addition to the 391,018 miles flown with mail on regular schedule, the records show 49,662 miles of test flights and ferry trips, making a grand total of 440,680 miles flown in the three months.

"During the quarter, we had eleven crashes. In two accidents, the ships were completely destroyed. In eleven cases of damage, eight occurred on our fields and three at points of forced landings.

"During the quarter, there were no fatalities or injury to employes on regular mail trips. However, there was one fatality on a ferry trip. On July 16, 1921, Pilot Howard Smith lost his life in ship No. 222 on the San Francisco field. He was assigned to ferry this ship to Reno and fell from an altitude of 300 ft. on the home field.

"The cost per mile of operation during this period was; July 73 cents, August 71 cents, September 70 cents. This shows an average of 71-1/3 cents per mile during this period. The records show that the cost during the same quarter of the year 1920 was 87 cents per mile.

"An exceptionally good record is being made on that portion of the Transcontintal Route between Cleveland and Chicago. The air distance is 335 miles. The last date on which a mail trip was defaulted was April 29, 1921. We have completed twenty-four weeks of 10 per cent performance on this leg of the route and we are now on our 25th week without a break. During the twenty-four weeks, the mails were flown 96,480 miles without default.

"A record flight was made by mail planes between Salt Lake City and San Francisco on Friday, Oct. 14. The time consumed from take-off at Salt Lake City (5:32) and arrival at San Francisco (11:33) was 6 hr. 1 min. A stop for service of eleven minutes was made at Elko, and a twenty-minute service stop was made at Reno; therefore, the actual flying time was 5 hr. 30 min.

"Train No. 9, the fast exclusive mail and express train operated over the Southern Pacific Railroad has a schedule of 24 hr. and 15 min. between Salt Lake City and San Francisco.

Following is an itemization of the accidents the Air Mail Service suffered during the quarter July 1—Sept. 30, 1921:

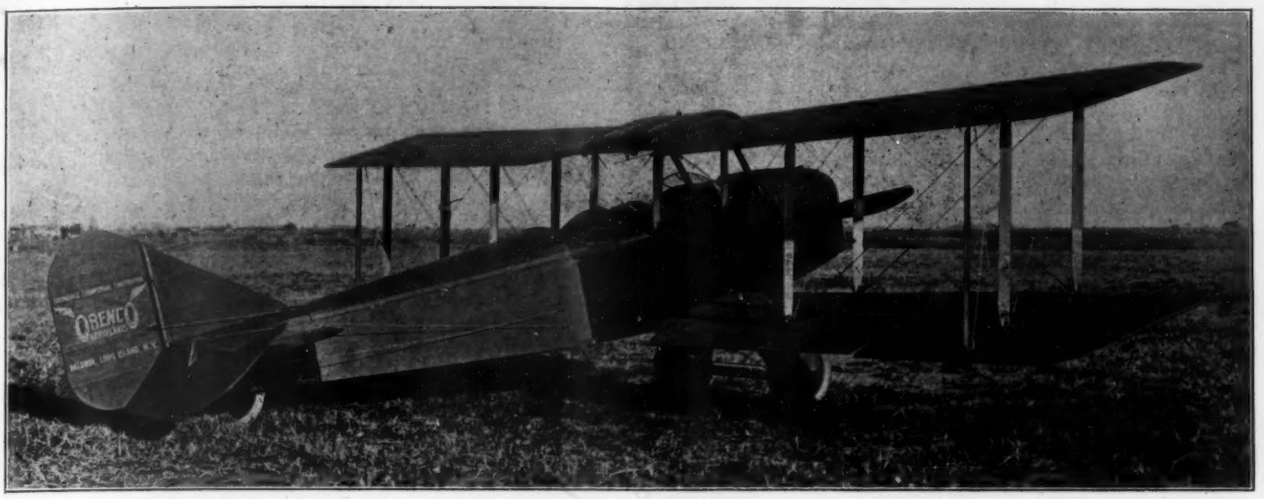
DATE	LOCATION	CAUSE	DAMAGE
July 2	Honey Creek, Iowa	Anemometer pump failed	Propeller damaged
" 11	San Francisco, Calif.	Skid landing	Propeller and radiator
" 13	Elko, Nevada.	Pancake landing	Damaged landing gear.
" 13	Cheyenne, Wyo.	Wind blew ship over on ground	Propeller, radiator and other slight damage.
" 15	Rock Springs, Wyo.	Hit light & dead air	Propeller, radiator, wings and landing gear.
" 15	Washington, N. J.	Forced down in storm	Broke longerons
" 16	San Francisco, Calif.	Unable pull out tail spin.	Ship totally destroyed.
" 20	Bellefonte, Penna.	Pancake landing	Broke bottom longerons
" 27	Chicago, Ill.	Broke wheel in landing.	Propeller, radiator, lower wing panels.
Aug. 4	Concord, Calif.	Out of gas.	Broke longerons, damaged wing and landing gear.
" 6	Elko, Nev.	Overshot field.	Ship entirely destroyed.

Of eleven cases of damage, eight occurred on or around fields and only three cases of damage at points of forced landings.

JL-12 in Fast Flight

The JL-12 armored attack monoplane, which carries thirty guns and powered with the 400 hp. Liberty engine, left the J.L. Flying Field at Central Park, L. I., at 9:15 a. m. Oct. 21 for Washington. Although flying against a 60 mile head wind at 2,500 ft. altitude for practically the entire trip, the JL-12 arrived at Washington at 11:45 a. m., or 2½ hr. from the start. The plane was piloted by Captain B. H. Pearson.

Orenco "Tourister II" Makes Successful Trials



THREE-QUARTER REAR VIEW OF THE ORENCO "TOURISTER II" 4-SEATER COMMERCIAL AIRPLANE

The Ordnance Engineering Corp. of New York and Baldwin, L. I., which last year produced the highly successful Orenco model D and D-2 single-seater pursuit airplanes, and also the "Tourister" commercial four-seater, has just brought out an improved model of the latter machine, known as the "Tourister II."

The "Tourister II," which like all Orenco machines was built to the designs of Walter H. Phipps, Chief Aeronautical Engineer of the firm, at the Orenco factory in Baldwin, L. I., is a tractor biplane fitted with the new 190 hp. Wright model E-2 engine.

General Features of Design

The machine follows well accepted standards in construction, the wings being built up on two spars with the well known composite rib work, while the fuselage is of the four longeron type, with wire braced cross pieces. The wings are surfaced with fabric. Two pairs of streamlined interplane struts connect the wings with one another on either side of the fuselage, and are trussed with flying and landing wires. The upper and lower wings of each side are identical in size and shape, which is a great advantage from the viewpoint of manufacturing. The upper wings are attached to a cabane of six struts which carry, instead of a center section, a streamlined gasoline tank. The ailerons blend into the shape of the wings, and although they are of the unbalanced type the transverse control of the machine is rapid and positive. The two ailerons of each side, there being four in all, are inter-connected by a streamlined steel rod.

The fuselage is of a shape which conciliates a good streamline with low production cost. The fuselage is covered with veneer around the passenger section and at the extreme end, the wooden skin contributing to the strength of the structure. The central portion is surfaced with fabric, while the cowling of the engine is of aluminum.

Two cockpits are provided for the convenience of the passengers, the latter sitting in pairs abreast. The cockpits are very roomy and comfortable, so much so that a fifth person can be carried without much discomfort in the front cockpit. The rear cockpit is fitted with dual controls, which permits of giving tuition under the best possible conditions and also makes it possible to have two pilots alternate at the stick.

The tail unit consists of a fixed tail plane with balanced elevator, and of a vertical fin with rudder. The control cables are led outside the fuselage so they may be readily inspected before a flight. A laminated tail skid of peculiar curvature, which practice has shown to be very efficient, supports the tail on the ground.

The Trials

The trials of the Orenco "Tourister II," which took place at Curtiss Field, Garden City, L. I., have brought out among other things the extreme ease with which the ship can be flown. On the first test flight, on Oct. 22, with Bert Acosta as pilot, and Mr. Phipps as passenger, the machine was subjected to all the maneuvers which may occur in every day flying and the response of the ship to the controls was found to be remarkably smooth and swift. After climbing to 2000 ft. Pilot Acosta made three loops which brought the machine down to 500 ft., and then landed in a flat glide.

Later on the same day the "Tourister II" was taken up by Pilot E. F. White, the former mail pilot who holds the record of the shortest time between Chicago and New York, and more flying tests were carried out. The high speed of the machine was measured over a carefully marked course, and was found to be 110 m.p.h. This is a remarkable performance, considering the load and the horsepower.

Altitude Flight to 14,000 Ft.

On Oct. 23 Pilot White took up numerous passengers, among whom E. R. Michie, president of the Ordnance Engineering Corp., his son Jack and his daughter Katherine, who went up together, thus giving an excellent example to the not-yet-flying public of the "normalcy" of aviation. On Oct. 27 Pilot Arthur O. Heinrich took the "Tourister II" up to 14,000 ft., carrying as passengers Robert F. Wright, flying observer for the Aero Club of America, Gerald D. Murray, of the Standard News Association, and Robert Nesmith, cameraman. This flight was officially witnessed by a representative of the Ae. C. A., and recorded by a sealed barograph. The altitude of 14,000 ft. was reached in 1 hr. 35 min. The altitude reached constitutes a new American record for landgoing airplanes carrying pilot and three passengers, since according to Ae. C. A. ruling seaplanes form a separate class of heavier-than-air craft for purposes of American records, although the F. A. I. does not recognize this distinction.

During all these flights strict records were kept of the gasoline consumption, and from preliminary estimates it appears that the cost of operating the Orenco "Tourister II" as a four-seater is about 90 cents per hour per person, or, since the cruising speed is 95 m.p.h., less than one cent per passenger mile.

A more detailed description of the Orenco "Tourister II," with specifications as prepared by the Ordnance Engineering Corp., follows.

Specifications

DIMENSIONS

Span, both wings	39 ft.	0	in.
Chord	5 ft.	0	in.
Gap	5 ft.	3	in.
Stagger		14.5	in.
Length overall	12 ft.	10	in.
Height overall (at center section)	9 ft.	4	in.
Distance from ground to C.L. of propeller	5 ft.	3	in.
Clearance between propeller and ground		11	in.
Propeller diameter	8 ft.	8	in.

AREAS

	sq. ft.
Main planes (4) each 76 sq. ft.	304.0
Center section	14.4
Ailerons (4) each 10 sq. ft.	40.0
Total supporting area	358.4
Fin 4.7, Rudder 11.8	16.5
Elevators 23.1, Stabilizer 27.7	50.8

WEIGHTS

	lb.
Total weight with full load	2825
Total useful load	978
Net weight	1847
Weight per horsepower	15.7
Weight per square foot of surface	7.3

PERFORMANCE

Maximum speed at ground	110	m.p.h.
Cruising speed	99	m.p.h.
Landing speed	49	m.p.h.
Duration of flight, 5 people (cruising speed)	2.4	hr.
Duration of flight, 4 people (cruising speed)	4.2	hr.
Duration of flight, 3 people (cruising speed)	6	hr.
Climb to 10,000 ft., full load	23	min.

Main Planes

The R.A.F. No. 15 wing curve is used. Both wings are set at an incidence of 2 deg.

Ribs in the slip stream are spaced 9 in. apart; beyond this the spacing is 12 in. Internal struts and wires are used for drift bracing.

The center section contains a gravity tank which holds 32 gal. of gasoline. Center section 44 3/16 in. wide.

Fuselage

Veneer of 3/32 in. three-ply mahogany covers the sides of the body from the radiator to the rear of the pilots' cockpit. Veneer on bottom from front landing gear strut to rear of cockpit. Veneer sides and bottom below the stabilizer.

The maximum width of the body, at front cockpit, is 44 3/16 in. outside. This provides ample room for three occupants.

Three longerons are used on each side. The top longeron is hinged at the left of the front cockpit and a veneer door swings outward. A streamline knob at the top locks the door, and being capped with channel steel, the longeron is as strong as though continuous.

Empennage

A high aspect ratio stabilizer is used, shown by experience to be desirable. The elevators are balanced so as to relieve the pilot of strain. The stabilizer is adjustable within small limits, though no alteration was found necessary by the test flights.

The fin and rudder are conventional and quite effective. One pair of cables from the pilot's foot-bar operates the rudder. The two rudder bars in the cockpit are interconnected by levers and a horizontal bar in front of the rudder bar.

Landing Gear

Wheels and axle are of the DH-4 type; their ruggedness makes them ideal for cross-country trips, and in case of breakage they are readily replaceable at most flying fields. The chassis Vs are of laminated spruce.

The tail skid is of special Oreneo design, developed from previously tested types.

Engine Group

The latest model Wright E-2 engine is used. This new engine develops 200 hp. at 1800 n.p.m. and 220 hp. at 2000 n.p.m. but its average number of revolutions in the F-4 is 1600 at which rate, the power is 180 hp. The engine weighs 485 lb. dry, with hub. Gasoline consumed per hp. hr., .48 lb.

The propeller was especially designed for the F-4 by the Hartzell Walnut Propeller Co. It is unusually efficient and gives a maximum of thrust for the power available. In combination with the Wright engine, the power unit is considered the most reliable known for this purpose.

A hand starting magneto facilitates starting. A hand-primer is located on the instrument board. Sperry instruments are used. The instrument board includes the following: turn-indicator; tachometer, air and oil pressure gages, air speed meter, altimeter, moto-meter, clock and compass. The engine throttle is in the center of the dashboard where it can be operated from either right or left rear seats. A hand pump below the seat is easily reached.

The main fuel tank, holding 48 gal., is directly below the front seat. From this tank the fuel is pumped (by the engine or by hand pump) to the large gravity tank in the center section. From the gravity tank the gas flows to the carburetor in a direct line so as to minimize the risk of obstructions in the line. A float-type capacity gage shows the pilot the amount of fuel in the gravity tank. A shut-off valve under this tank has an extension handle within the pilot's reach.

The radiator is made of standard hexagon copper tubes 4 in. long. Area of radiating surface, 176 sq. ft. Frontal area of radiator, 668 sq. in. Shutters, controlled from the pilot's cockpit, are put into operation to reduce the cooling effect at altitudes and ordinary cold weather temperatures.

Mercurial Barometer for Airships

To meet the needs of the large rigid airships a mercury aerial barometer has recently been designed by the Instrument Department, British Air Ministry, and constructed by Messrs. Negretti and Zambra.

The barometer is of the Kew type and is supported on gimbal bearings from a bracket attached to the framework of the airship in such a way that the column may remain vertical with the supporting bracket inclined at 20 deg. to the vertical in any direction. Two dashpots are provided to damp out any swinging of the instrument. These consist of cylinders which are attached to the back of the mercury cistern and carry loosely fitting pistons suspended by ball joints from the supporting bracket; the cylinders are filled with a mixture of glycerine and water.

The mercury column is of large diameter, 0.5 inch, to eliminate the necessity for any correction for capillarity, while to avoid any inaccuracies due to the fact that the pressure in the control car is very rarely static,† the mercury cistern is not directly open to the atmosphere, but is connected to the static tube of a hanging head slung some 30 feet below the ship, and therefore clear of any disturbance due to the passage of the ship through the air. The nipple to which the static head is connected is fixed to the supporting bracket, and a rubber tube leads therefrom to a stopcock on the cistern, thus avoiding any restraint on the swinging of the barometer.

The end of the barometer tube which dips into the mercury in the cistern is nearly closed by a conical plug, the exact position of which may be adjusted by a screw. By use of this device any oscillations of the mercury column may be damped out, or, again, the column may be restrained in any one position at will for a reading to be made at leisure. Moreover, to facilitate transport of the instrument the column may be pumped down and the plug closed.

The right-hand side of the barometer carries a pressure scale graduated in millibars; the vernier has a coarse adjustment by sliding and a fine adjustment by rack and pinion operated from the knurled knob seen just beneath the gimbal ring.

The left-hand side of the column carries a movable scale showing heights in feet. This scale is graduated according to the usual convention to be correct for all heights when the air pressure is 1013.2 mb. at the zero height and the air temperature is uniformly 50 deg. F. For convenience of use in landing and in other operations the height scale may be adjusted by means of the knurled knob on the left of the column to place its zero opposite any desired pressure. This height scale is intended as a rough guide when quick readings are called for; for accurate estimates of height it is necessary to use the pressure readings in conjunction with temperature observations.—*The Meteorological Magazine*, Aug. 1921.

†The static pressure is the pressure in the free atmosphere at the same level. If a tube with holes in its sides is set in such a way that the air can stream past it without being obstructed, the pressure inside the tube is equal to the static pressure.

"Who's Who in American Aeronautics"

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Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

Clarence Edward Shankle

SHANKLE, CLARENCE EDWARD, 1st Lieut., Air Service; born, Newark, Tex., Oct. 13, 1893; son of J. D. Shankle and Lula Shankle; married, Norma Katherine Smith, Jan. 6, 1920.

Educated: High school; 1914, North Texas State Normal College.

Aeronautical Activities: Flying cadet, Wilbur Wright Field, 1917; flying cadet, Ellington Field, 1917-1918; Student Officer of Pursuit Training at Carlstrom and Dorr Fields; Flying Instructor at Ellington Field to June 1919; with the 20th Squadron, Kelly Field from Sept. 1920 to Nov. 1921; 14th Squadron, Langley Field to date.

Flying Rating: Reserve Military Aviator, March 1918; Airplane Pilot.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, Memphis, Tex.

Harold F. Marshall

MARSHALL, HAROLD F., Advertising; born, Brooklyn, N. Y., July 15, 1896; son of Robert A. Marshall and Gertrude (Hardwick) Marshall.

Educated: Cranford High School, Cranford, N. J.; 1913-1914, Lafayette; 1915-1917, Mass. Inst. of Tech.; 1919, Grenoble University.

Professional: Engineering 1914-1915; Army Air Service, 1917-1919; publishing business, 1920-1921; automobile accessories advertising, 1921.

Aeronautical Activities: Assistant in Mechanical Engineering Department, Wright-Martin Aircraft Corp., 1916; studied Aerodynamics at M. I. T., 1916-1917; advanced flying instruction at Issoudun, France, 1918; after Armistice with Army of Occupation acting as Motor Transport Officer; lectured for service school on work of observation service; 1919, with Aeromarine Co. on flying boat design.

Flying Rating: Reserve Military Aviator, Oct. 4, 1917.

War Service: June 1917 to Aug. 1919, Army Air Service.

War Honors: Citation, First Army Air Service, Dec. 31, 1918.

Member: Aero Club of America; Junior, American Society of Mechanical Engineers.

Present Occupation: Advertising, automobile equipment.

Address: 405 Union Ave., Cranford, N. J.

James Pratt Hodges

HODGES, JAMES PRATT, 1st Lieut., Air Service; born, Oakley, Md., Oct. 7, 1894; son of Thomas G. Hodges and Corine (MacWilliams) Hodges; married, Eunice Palmore Fadeley, March 14, 1917.

Educated: High school.

Aeronautical Activities: Training at Park Field, 1917; appointed Assistant Stage Commander, Formation Stage, 1918; appointed Formation Stage Commander, Oct. 1918; student at school of aerial photography, 1919; C. O. 7th Photo Section, May 1920 to March 1921; C. O. Photographic School, Air Service, April 1921 to date.

Flying Rating: Reserve Military Aviator; Airplane Pilot.

War Service: 1917 to date.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, Congress Heights, Washington, D. C.

Charles Leonard Shaw

SHAW, CHARLES LEONARD, Advertising; born, Ossipee, N. H., Sept. 4, 1896; son of Charles Jefferson Shaw and Ellen (Birtwhistle) Shaw.

Educated: Public schools of Orono, Me. and Malden, Mass.; Wentworth Institute, Boston, Mass.

Professional: 1916, Norton Company, Worcester, Mass.

Aeronautical Activities: U. S. S. M. A., Princeton, University, 1918; training at Camp Dick, Taylor Field and Kelly Field.

Flying Rating: Reserve Military Aviator.

Member: Aero Club of Massachusetts.

Present Occupation: Assistant Publicity Manager, Norton Co.

Address: 1 New Bond St., Worcester, Mass.

Byrne Virchow Baucom

BAUCOM, BYRNE VIRCHOW, Capt., Air Service; born, Milford, Tex., June 19, 1892; son of James B. Baucom and Edith E. (Himmell) Baucom.

Educated: Milford High School, Milford, Tex.; University of Texas.

Professional: Journalist and linotype operator; resigned from the Texas Legislature in Nov. 1920 to return to the Air Service.

Aeronautical Activities: Training at Ft. Sill, Dec. 1917 to Feb. 1918; active duty in France, May 1918 to July 1919; C. O. Provisional Pursuit Squadron, Langley Field, June 1921.

Flying Rating: Aerial Observer, Feb. 1918; Reserve Military Aviator, March 1919.

War Service: Army Air Service, Nov. 1917 to date.

War Honors: Distinguished Service Cross; two citations: Byrne V. Baucom, Second Lieutentant, Air Service, Observer, 1st Aero Squadron. "For extraordinary heroism in action in the Chateau-Thierry and St. Mihiel Salients, France. Lieutenant Baucom, with 1st Lieut. William P. Erwin, pilot, by a long period of faithful and heroic operations set an inspiring example of courage and devotion to duty to his entire squadron. Throughout the Chateua-Thierry actions in June and July, 1918, he flew under the worst weather conditions and successfully carried out his missions in the face of heavy odds. In the St. Mihiel Sector, Sept. 12-16, 1918, he repeated his previous courageous work. He flew as low as fifty feet from the ground behind enemy lines, harrassing German troops with machine guns and rifles. He twice drove off enemy planes which were attempting to destroy American observation balloons. On Sept. 12-13, 1918, he flew at extremely low altitudes and carried out infantry contact patrols successfully. Again on Sept. 12 he attacked a German battery, forced the crew to abandon it, shot off his horse a German officer who was trying to escape, drove the cannoneers to their dugouts, and kept them there until the infantry could come up and capture them." "For the act of extraordinary heroism in action near Sedan, France, Nov. 5, 1918, Lieut. Baucom is awarded an oak-leaf cluster to be worn with the Distinguished Service Cross awarded him Oct. 1, 1918. With atmospheric conditions such that flying was almost impossible, he voluntarily undertook a flight as observer to locate the position of enemy troops and machine-gun nests which had been holding up our advance and causing severe casualties. Forced to fly at a very low altitude and subject to almost constant anti-aircraft and rifle fire, he obtained the information that was vital to the success of our operations and dropped the message at Division Headquarters. He then penetrated far into the enemy lines and opening fire upon enemy crews routed them from a series of machine-gun nests. When his machine was finally shot down, he succeeded in operating the gun and beat off an attack by the enemy in force. Armed only with revolvers and German grenades which they found in an enemy emplacement, he and his observer then worked their way back to the American line with valuable information, repeatedly subjected to enemy fire on their way.

Present Occupation: Captain, Air Service.

Address: Langley Field, Pa.; home, Milford, Tex.

Leo Andrew Walton

WALTON, LEO ANDREW, Major, Air Service; born, Salem, Ore., Oct. 7, 1890; son of James Walton and Mary E. Walton; married, Frede A. Koch, Jan. 29, 1919.

Educated: East Salem Grade School; Salem High School; Willamette University.

Professional: Banking business before joining army.

Aeronautical Activities: Training at Kelly, Call, and Brooks Fields; Staff of District Supervisor, Nov. 1919; Langley Field, Nov. 1920 to date.

Flying Rating: Junior Military Aviator, July 1917; Airplane Pilot.

War Service: Cadet, 1911-1915; 10th Cavalry, 1915-1916; Air Service, 1916 to date; service in Mexico in 1916.

Present Occupation: C. O. 1st Prov. Bombing Group.

Address: Langley Field, Va.; home, 1077 Center St., Salem, Ore.

Lloyd T. Jones

JONES, LLOYD T., Prof. of Physics, University of California; born, Raymond, Ill., Feb. 1887; son of Albert M. Jones and Etta C. Jones; married, Freda O. Stricklan, Aug. 30, 1914.

Educated: Public schools of Raymond, Ill.; A. B. 1909, A. M. 1910, Lake Forest College; Ph.D. 1915, University of Illinois.

Professional: 1906-1908, General blacksmith and wagon maker with father; 1910-1915, Instructor in Physics, University of Illinois; 1915-1917 and 1919, Instructor in Physics, University of California.

Aeronautical Activities: May 1917, was sent by the War Department to the R. F. C. School at Toronto, returning to the University of California where he was one of the three founders of the School of Military Aeronautics at that institution. For eleven months he continued in charge of machine gun instruction at that school; April 1918, reported to Chief Signal Officer in Washington for duty and was assigned to Air Service Gunnery in charge of all ground school instruction in machine guns; placed on the list for flying instruction at Bolling Field under Lieuts. Lucas and Benjamin; promoted to Captain, Sept. 1918 and acted as executive office of the Gunnery Branch; completed flying instruction at Mather and March Fields, 1919.

Flying Rating: Reserve Military Aviator; Pursuit Pilot.

War Service: Army Air Service, 1917-1919.

Member: American Legion.

Present Occupation: Professor of Physics, University of California.

Address: 2714 Prince St., Berkeley, Calif.

Richard I. Elliott

ELLIOTT, RICHARD I., Engineer; born, Morristown, N. J., Nov. 22, 1869; son of William St. George Elliott and Annie Rankin (Lee) Elliott; married, Jennie Mae Conn, Sept. 20, 1899.

Educated: Private schools in Germany, Switzerland, and England; University College, London; 1890, Technical Institute of London.

Professional: Engineering (electrical and mechanical) 1890-1896; Patent Attorney, 1896-1917; Airplane Engineering and experimental work, 1910 to date.

Aeronautical Activities: Senior Inspector and Aeronautical Mechanical Engineer from beginning of war, at Boeing Airplane Co., Seattle, Wash.; Dayton district office, West Virginia Aircraft Co.

Present Occupation: Engineer and Patent Attorney.

Address: Wheeling Steel Corp. Bldg.; home, 2110 Warwood Ave., Wheeling, W. Va.

Isidor Richmond

RICHMOND, ISIDOR, Architect; born, Chelsea, Mass., Dec. 2, 1893; son of Hyman Richmond and Lena Richmond.

Educated: Public and high schools of Revere, Mass.; 1916, Mass. Inst. of Tech.

Professional: Architect.

Aeronautical Activities: M. I. T. Naval Aviation Ground School, Feb. 1918; Naval Air Station, Chatham, Mass., Aug. 1918 to April 1919.

Flying Rating: Naval Aviator, 1917.

War Service: Patrol duty, Naval Air Station, Chatham, Mass.; Lieut. (J. G.) U. S. N. R. F.

Present Occupation: Architect.

Address: 10510 Euclid Ave., Cleveland, Ohio; home, 69 Everard St., Beachmont, Mass.

Sigmond Franklin Landers

LANDERS, SIGMOND FRANKLIN, 1st Lieut., Air Service; born, Carthage, Mo., Oct. 31, 1891; son of George W. Landers and Nancy C. Landers; married, Tressa Taylor, June 5, 1919.

Educated: Loveland High School, Loveland, Colo.; Colorado Agricultural College.

Aeronautical Activities: Flying training, 1918; commissioned 2nd Lieut., Air Service, Oct. 1918.

Flying Rating: Reserve Military Aviator, Oct. 1918; Airplane Pilot.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, 747 Jefferson Ave., Loveland, Colo.

Harmon Chadbourn Rorison

RORISON, HARMON CHADBOURN, Banker; born, Wilmington, N. C., April 15, 1893; son of Richard B. Rorison and Lizzie (Chadbourn) Rorison.

Educated: Union and Tileston High School, Wilmington, N. C.; University of Virginia; Jefferson School, Charlottesville, Va.; B.L. 1916, University of Georgia.

Professional: 1916-1917, Real Estate and Insurance, Wilmington, N. C.

Aeronautical Activities: Private course in flying at Staten Island Aviation School, 1917; Ohio State University Ground School; sent to Mineola for training; commissioned 1st Lieut., Nov. 18, 1917; trained at Issoudun on Nieuports; French Aerial Gunnery School at Caseaux; tested DH4's at Romorantin for several months; assigned to 13th Squadron 2nd Pursuit Group; transferred to 22nd Squadron 2nd Pursuit Group; discharged May 1919 and commissioned Captain, U. S. R.; Oct. 1919, returned to Europe and went to Poland and joined the Polish Flying Corps; served in Kosciuszko Squadron on many fronts as Flight Commander against the Russian Bolsheviki; attacked advancing Russian troop trains, also attacked Cavalry, especially Cossacks, machine gun nests and Infantry, all from very low altitudes; twice shot down in Russia, once fifty kilometers behind the Bolsheviki lines; served as Lieutenant, and later promoted to Captain, Polish Army; returned to U. S. 1920.

Flying Rating: Reserve Military Aviator, Oct. 1918; Aero Club expert license; Polish Military Aviator.

War Service: U. S. Army, April 1917 to May 1919; Polish Army in Poland and Russia, Nov. 1919 to Aug. 1920.

War Honors: Distinguished Service Cross, Dec. 1918; Virtuti Militari, (Poland's highest decoration); cited by French; Krytz Walecznych, (Polish with three bars, signifying this decoration was awarded him four times); Liberation de Pologne.

Member: Aero Club of Ameria.

Present Occupation: Banker.

Address: Citizens Bank and Trust Co.; home, Oleander St., Wilmington, N. C.

Evers Abbey

ABBEY, EVERS, 1st Lieut., Air Service; born, Hartford, Conn., Feb. 1, 1895; son of Lerbert Clifton Abbey and Mary E. Abbey.

Educated: Public and high schools of New York City; 1914-1916, New York University, M. E.

Professional: 1916-1917, Assistant Director, motion pictures.

Aeronautical Activities: School of Aerial Photography, Fort Sill, Okla., 1917-1918; School of Aerial Photography, Cornell University, 1918; Aerial Mapping Detachment, Tucson, Ariz., 1920; 1921, School of Aerial Photography, Langley Field.

Flying Rating: Aerial Observer, Sept. 1918; Reserve Military Aviator, May 1919; Airplane Pilot, 1920.

War Service: As above.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, 316 West 102 St., New York City.

Howard D. Norris

NORRIS, HOWARD D., 1st Lieut., Air Service; born, Washington, D. C., July 28, 1896; son of Howard D. Norris and Gertrude H. Norris.

Educated: Maplewood Institute; St. John's College; Emerson Institute; George Washington University.

Professional: Five years with Patent Law Firm.

Aeronautical Activities: U. S. S. M. A., Cornell University, Oct. 1917; flying training at Selfridge Field; Instructor, Aerial Gunnery, Selfridge Field, May 1918 to Sept. 1919.

Flying Rating: Airplane Pilot.

Member: Aero Club of America.

Present Occupation: 1st Lieut., Air Service.

Address: Mitchell Field, L. I., New York.

Raymond J. Schirm

SCHIRM, RAYMOND J., Builder; born, Lafayette, Ind., April 22, 1896; son of Louis Schirm and Margaret A. (Dolan) Schirm.

Educated: Grammar and high schools of Los Angeles, Calif.

Professional: Portland cement industry.

Aeronautical Activities: U. S. Air Service; Ground School, University of California; training at Kelly and Taylor Feilds.

Flying Rating: Reserve Military Aviator.

War Service: U. S. Air Service.

Member: Aero Club of Southern California; Los Angeles Athletic Club.

Present Occupation: Builder.

Address: 840 Commercial St.; home, 2801 Dalton Ave., Los Angeles, Calif.

Harry Harmon Blee

BLEE, HARRY HARMON, Consulting Engineer; born, Santa Ana, Calif., May 18, 1887; son of Robert J. Blee and Jennie (Harmon) Blee; married, Gladys Howard, Dec. 11, 1914.

Educated: Santa Ana Grammar and High Schools; A.B.M.E. 1910, M.E. 1911, Leland Stanford Junior University.

Professional: 1911, Instructor in Mechanical Engineering at Stanford University; 1912, Power Plant Design and Testing, San Francisco and vicinity; 1913-1917, Mechanical and Hydraulic Engineering, California State Department of Engineering; 1920, Water Supply and Irrigation Engineering, California State Department of Engineering; 1921, Consulting Engineer.

Aeronautical Activities: Oct. 26, 1917, entered employ of Aviation Section, Signal Corps, as Aeronautical Mechanical Engineer; duty in Airplane Engineering Department, Equipment Division; Nov. 12, 1917, appointed assistant to the Chief of the Airplane Engineering Department at Mc Cook Field; Feb. 1918, commissioned Captain, Aviation Section, Signal Corps; representative of Airplane Engineering Division at full flight performance tests; May 1918, Chief of Technical Publications and Library Department; Jan. 1919, Chief of Information Branch, Engineering Division; March 1919, Historical Section, Information Group, Air Service; discharged Dec. 1919 and commissioned Major, Air Service, Reserve Corps, United States Army.

War Service: As above.

Member: American Society of Mechanical Engineers.

Present Occupation: Consulting Engineer.

Address: 311 Orange Ave., Santa Ana, Calif.; home, San Juan Capistrano, Calif.

Stewart Wellington Torney

TORNEY, STEWART WELLINGTON, 1st Lieut., Air Service; born, Chicago, Ill., April 14, 1898; son of John Alfred Torney and Elizabeth (Ford) Torney; married, Edna Mae Hutton, April 14, 1920.

Educated: Medford High School, Medford, Ore.

Aeronautical Activities: Began flying, Jan. 1918; School of Aerial Gunnery, Fort Worth, Tex., June 1918; First Provisional Wing, Hazelhurst Field, July 1918 to Nov. 1918; Transcontinental Race in Oct. 1918; Primary Instructor, Dec. 1919 to Nov. 1920 at Carlstrom Field; School of Aerial Photography, Langley Field, Jan. 1921 to April 1921; First Provisional Air Brigade to date.

Flying Rating: Reserve Military Aviator, May 1918; Airplane Pilot.

Present Occupation: 1st Lieut., Air Service; Engineer and Transportation Officer of School of Aerial Photography.

Address: Langley Field, Va.; home, 3657-17th Ave., N. E., Seattle, Wash.

Neta M. Snook

SNOOK, NETA M., Pilot Instructress; born, Mt. Carroll, Ill., Feb. 14, 1896; daughter of Wm. Floyd Snook and Adelle May Snook.

Educated: Mt. Carroll public schools; Francis Shimeo School; Iowa State College; University of Iowa; Elmira Academy, Elmira, N. Y.

Aeronautical Activities: Began flying June 1917; Aviation Schools at Newport News, Va. and Miami, Fla., 1917-1918; British Air Ministry, July 1918 to Jan. 1919; exhibition flying, 1920; operated field in Los Angeles, Calif., 8 months to March 1921; wing expert with Davis Douglas Co. to date.

Flying Rating: License for flying civilian aircraft, July 1919; Aero Club of America license, Oct. 1920.

War Service: British Air Ministry, July 1918 Jan. 1919.

Member: Aero Club of America; Aero Club of Southern California; Aero Club of Iowa.

Present Occupation: Pilot instructress.

Address: Goodyear Field, Los Angeles, Calif.; home, 518 W. Belgrave Ave., Huntington Park, Calif.

Ludlow T. Lanman

LANMAN, LUDLOW T., Banking Business; born, Brooklyn, N. Y., Sept. 29, 1897; son of Jonathan Trumbull Lanman and Mary (Ludlow) Lanman.

Educated: Groton School, Groton, Mass.; A. B. 1920, Harvard University.

Professional: Jones & Lanman, Sept. 1920 to Feb. 1921; New York Trust Co., Feb. 1921 to date.

Aeronautical Activities: Training at Kelly and Brooks Fields, 1918; acted as Instructor and Flight Commander at Brooks Field, 1919; flew on Harvard team in Intercollegiate Air Races at Mitchell Field, May 5, 1920.

Flying Rating: Reserve Military Aviator, April 2, 1918.

Present Occupation: Clerk, New York Trust Co.

Address: 120 Broadway; home, Lawrence, Long Island, N. Y.

William Gray Schauffler, Jr.

SCHAUFFLER, WILLIAM GRAY, Jr., Commercial Aviation; born, Beirut, Syria, Nov. 24, 1891; son of William Gray Schauffler, Sr. and Eleanor (Hawks) Schauffler; married, Augusta Spring de Forest, Oct. 11, 1919.

Educated: Curtiss School, Brookfield Center, Conn.; Taft School, Watertown, Conn.; 1909, Yale Forestry School S. C.; University of Wisconsin Agricultural School, S. C. 1910.

Professional: Two years cotton manufacturing, Newburyport, Mass.; Newspaper reporter; farmer; United States Forest Service as timber estimator; with New York Sporting Goods Co., New York City as camp goods salesman.

Aeronautical Activities: Commenced flying at San Diego, Calif. in fall of 1915; enlisted Aviation Section, Naval Reserve, March 1916; commenced training with Curtiss Aviation School, June 1916; enlisted Signal Reserve Corps, Nov. 1916 and received Army flying training.

Flying Rating: Aero Club of America Pilots License No. 575; Expert Pilots License No. 72; Airplane Pilot, 1920.

War Service: Commissioned 1st Lieut., S.O. R.C., March 17, 1917; duty First Aero Squadron, Aug. 13, 1917 in U. S. A. and A. E. F.; first flight over German lines, April 2, 1918; Commanding Officer, 90th Aero Squadron, June 30, 1918, took part in St. Mihiel Drive and Meuse-Argonne Drive, 1918; promoted to Captain, Oct. 3, 1918; Commanding Officer, 3rd Corps Observation Group, Oct. 20, 1918; Assistant Chief of Staff, first Army Air Service, Dec. 6, 1918; Chief of Staff, First Army Air Service, Feb. 3, 1919; promoted to Major, April 9, 1919; returned to U. S. A., July 12, 1919; Commanding Officer, First Surveillance Group, Kelly Field, Aug. 31, 1919; Operations Officer, First Wing, Kelly Field, Oct. 25, 1919; discharged, Oct. 15, 1920.

War Honors: Croix de Guerre; received citations March 27 and June 3, 1919; Distinguished Service Cross; credited with one enemy plane.

Member: Aero Club of America; Military Order of Foreign Wars; Veterans of Foreign Wars; Distinguished Service Order of The United States.

Present Occupation: President, American Airways Training Schools, Inc.

Address: Monmouth Hills Club, Highlands, N. J.

Orlo Allen Powell

POWELL, ORLO ALLEN, Mechanical Engineer; born, Stuart, Nebr., July 30, 1895; son of Allen C. Powell and Anna C. Powell.

Educated: Public schools of Stuart, Nebr.; Bachelor of Science in Mechanical Engineering 1917, University of Nebraska.

Professional: 1917, 1919 to date, Mechanical Engineer, Cushman Motor Works, Lincoln, Nebr.

Aeronautical Activities: Dec. 1917 to March 1918, Ground School, Berkeley, Calif.; training at Camp Dick and Carlstrom Field, 1918; Flight Commander, Brooks Field, 1918-1919.

Flying Rating: Reserve Military Aviator, July 1918.

War Service: Dec. 1917 to Jan. 1919.

Member: Lincoln Aero Club.

Present Occupation: Mechanical Engineer, Cushman Motor Works.

Address: 21 and X Sts.; home, 2727 Summer St., Lincoln, Nebr.

William Lewis Boyd

BOYD, WILLIAM LEWIS, 1st Lieut., Air Service; born, Pittsburgh, Pa., Dec. 23, 1896; son of John Thomas Boyd and Mary (Lewis) Boyd; married, Mary Persus Turck, July 3, 1920.

Educated: Public and high schools of Pittsburgh, Pa.; School of Engineering, University of Pittsburgh.

Aeronautical Activities: Princeton Ground School, 1917; trained at Love Field, Wilbur Wright, Carlstrom, and Langley.

Flying Rating: Pursuit Pilot, July 1918.

War Service: As above.

Member: Aero Club of America.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, 3721 Perrysville Ave., Pittsburgh, Pa.

Joseph Erwin Morris

MORRIS, JOSEPH ERWIN, Banking; born, Brooklyn, N. Y., Sept. 21, 1896; son of James Morris and Eleanor Morris.

Educated: Public and high schools; City College of New York; Brooklyn Polytechnic College.

Professional: Investment banking, 1919 to date.

Aeronautical Activities: Training at Eberts Field, 1918-1919; member Aviation Section, New York City Police Reserve.

Flying Rating: Reserve Military Aviator, Jan. 1919.

Member: New York Reserve, Aviation Section.

Present Occupation: Banking.

Address: 166 Montague St.; home, 348a Douglas St., Brooklyn, N. Y.

Effect of Low Grade Gasoline on Engines

By W. W. Wyman

C. L. Maguire Petroleum Co.

It is folly for the pilot of aircraft to use anything that will reduce the absolute dependability of the aeronautical motor. He must know that the gasoline he puts into his aircraft is entirely suitable.

In years past the automobile owner bought gasoline on what he called "test": it was "70 test", "65 test", or "60 test". He did not know the meaning of this test, but it really referred to the Baumé Gravity of the gasoline. This "test" or gravity of the gasoline used to be a fair measure of its quality—the higher the "test" or gravity the better the gasoline. But since the coming of the more general use of absorption and casing-head gas gasolines blended with low gravity gasoline or kerosene, this "test" gravity is not a good indication of the quality, because a poor blended gasoline might have a high gravity but have entirely too high an end point.

Two Conclusive Tests

There are two tests which better indicate the quality or suitability of gasoline, assuming that the intermediate curve of distillation is uniform. These two tests are the initial boiling point and the end point.

The initial boiling point is the temperature at which the first drop is recovered after the gasoline has been vaporized by gradual heating and then condensed. Straight gasoline should never enter the combustion chamber of any internal combustion engine. The gasoline should be vaporized and this gasoline vapor mixed with air in correct proportions forming the gas that explodes in the combustion chamber. The lower the initial boiling point of gasoline the lower the temperature at which, and the easier, it will vaporize making the engine start easily even at nominally low temperatures. Good automobile gasoline should have an initial boiling point of not over 140 deg. F.

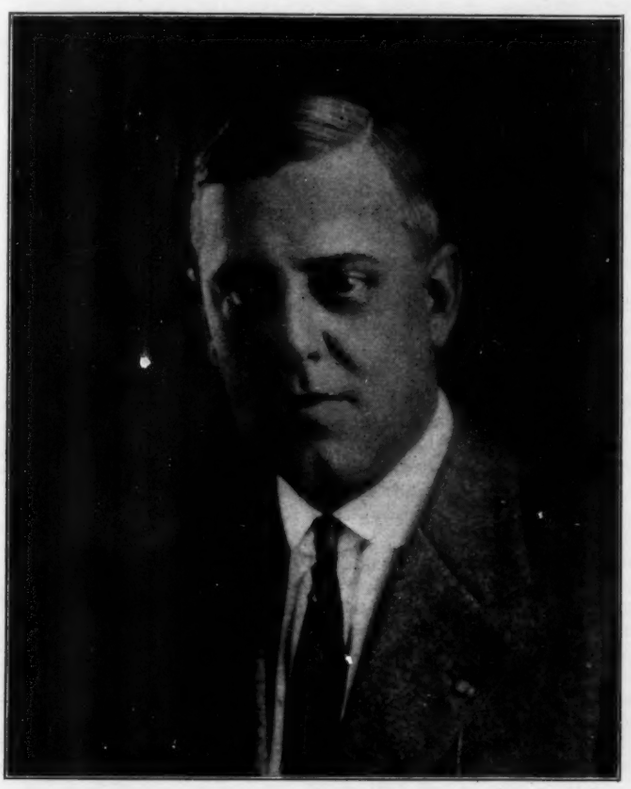
The end point, or final point, as it is often called, is the temperature at which all or at least 98 per cent of the gasoline has vaporized. This test or end point should also be low —the lower the better, but for automobile use it should never be above 450 deg. F. The best automobile gasolines have end points between 400 and 437 deg. F.

If the end point is very high it means that a part of the gasoline will not be vaporized at working temperatures. This part of the gasoline is generally called the "heavy ends". These heavy ends will sometimes remain in the float chamber of the carburetor, and if enough accumulates there the float-chamber will be filled with gasoline that will not properly vaporize and prevent vaporizable gasoline from entering the carburetor, causing the engine to stop. The more common fault of these heavy ends or non-vaporized parts of gasoline is that they will be drawn by the suction of the pistons into the manifold and into the combustion chambers as globules of raw gasoline. These globules of raw gasoline take space in the combustion chamber and are ignited by the explosion charge but give no power to this charge. They are generally still burning when the explosion and power stroke are over, and thus increase the heat of the exhaust valves and the whole engine.

During the compression stroke of the piston, part of these heavy ends are forced past the piston rings by the pressure of the compression and drop down into the crank-case, where they mix with and thin out the lubricating oil. This action will soon make the heaviest lubricating oil too thin to function properly. Have you ever heard a man say he had burned out his crank-shaft bearings when he had plenty of oil therein? There was a reason—lubricating oil mixed with gasoline does not make a good lubricant.

As it is necessary for an aeronautical engine to start readily, it is best to accomplish this without priming, because a large part of the priming charge finds its way into the lubricating oil sump. Therefore gasolines suitable for aeronautical engines should have a lower initial boiling point than is necessary for automobile engines. This initial boiling point should be between 90 and 110 deg. F. and should not be over 130 deg. F. A gasoline with an initial boiling point below 100 deg. is not suitable at high altitudes, because the reduced air pressures at altitudes over 6000 ft. will make it boil and cause vapor pockets in the gasoline supply line.

The aeronautical engine consumes gasoline at a rate many times faster than an automobile engine. This speed of consumption gives the gasoline less time in which to vaporize,



W. W. Wyman, of the C. L. Maguire Petroleum Co.

therefore the greater the chance of non-vaporized particles or heavy end being drawn uselessly through the engine, causing loss of power and over-heating, with possible warping of the exhaust valves.

To take care of the expansion of pistons under the high temperature at which most aeronautical engines run, the piston clearance is much greater in aeronautical than in automobile engines. These wide clearances, large gasoline consumption, and higher compression pressures in the aeronautical engine make it possible for a large part of these heavy ends to get past the pistons and into the lubricating oil, soon diluting it to the danger point. Thus it is very necessary that the gasoline used in aeronautical engines should have a low end point, in fact it should be so low that all of the gasoline will be vaporized. The end point of aviation gasoline should be between 290 and 350 deg., but should never be over 374 deg. F.

This fault of the heavy ends of gasoline getting into the crank-case or oil sump of a motor will ruin, and render unfit for further use, the best aeronautical lubricating oil. Two identical aeronautical engines could be run on the same test with the same lubricating oil, but with one engine using poor gasoline with high end point, and the other engine using

suitable gasoline with low end point, and the results of this test, from the standpoint of the lubricating oil, could be wholly unsatisfactory on the engine using poor gasoline. Thus all effort to secure the most suitable lubricating oil for aeronautical engines could be wasted by using an unsuitable gasoline. Hence the importance of using the right kind of gasoline in all aeronautical engines.

The automobile owner can afford to take a chance on poor fuel reducing the power of or the stalling of his motor, because the most it can mean to him is his inconvenience. Not so with the aircraft pilot, for any one of the above mentioned faults, caused by poor or unsuitable gasoline, may be the direct cause of injury or loss to his aircraft, and sometimes injury or loss of his life.

An Instructive Flight

The writer recently flew on board the Aeromarine flying cruiser Santa Maria from Chicago to New Orleans to observe the results of using high and low test gasoline in Liberty engines.

For reasons outlined above it is most expedient to use gasoline that closely conforms in every way to the U. S. government specifications for domestic aviation gasoline—W.D. Spec. No. 2-40. But until the federal, state or municipal governments, either singly or combined, establish throughout the United States a network of uniform landing fields or air ports, equipped with a supply of suitable aviation gasoline and lubricating oil, it will be necessary, when making long overland or overwater flights, to use ordinary automobile gasoline of varying qualities.

The Santa Maria was able to get suitable high test gasoline at nearly all stops on its trip from Havana, Cuba, to Chicago but in the southern states it was not available. Automobile gasoline procurable in the South is of mediocre quality and not fit for aviation work. This gave the opportunity to observe the effects of very low grade gasoline on the engines and also on the lubricating oil.

Until reaching St. Louis it was possible to get a grade of gasoline that is sold to farmers for stoves and lighting. This had high gravity and low end point. This gave very good satisfaction, maintaining the proper revolutions on the motors without overheating, but it was not possible to get this gasoline at St. Louis, and from there south the gasoline got poorer and poorer and the weather or air temperature got hotter and hotter. The engines had to operate under the most unfavorable conditions imaginable but this was welcomed as it gave an opportunity of seeing not only how Lakeside Aviation Oil stood up but also to study the effects of different grades of gasoline on the engines as well as the effects of low grade gasoline on the cylinder lubrication.

As we did not let the main supply tanks get very low, we did not notice for several flying hours the effects of using unsuitable gasoline, for the light, good gasoline had come up through the heavy, poor gasoline and "sweetened the pot" as it were.

Results of Poor Gasoline

By the time we got to Helena, Ark., the air temperature had climbed to 100 deg. F. and we began to see the effects of the low gravity, high initial and high end point gasoline. The engines lost revolutions and overheated slightly. At Helena it seemed as if all who wanted to ride in the Santa Maria thought of it at the same time and as the Commander did not like to disappoint prospective passengers he made seven full load hops in a little over two hours. Knowing the engines had been through similar experience using regular aviation gasoline and another lubricating oil, observation was especially keen at Helena.

Taking off in a 15,000-lb. seaplane is much harder on the engines than taking off on land, for the drag of the water on the hull is so much greater than the drag of the wheels of landing gear. This was just the time when we needed good high test gasoline, but we had had none since leaving Alton, Ill. The engines got hotter after each hop, the revolutions fell off until it took us longer each time to take off.

The water temperature mounted to the 200 mark and on the last two hops the pointer stayed around 215. The effect of those troublesome "heavy ends", which occupy space but give no power, caused a drop in the revolutions of the engines, and the effect of their slow burning resulted in their abnormally heating, which warped the exhaust valves on three cylinders. But it was interesting to note that through all this the oil pressure only fell off 4 lb. below the average and the oil temperature increased only 8 deg. above the average. Immediately after shutting off the engines the last time, they cranked as easily as when at normal temperature, This showed that the lubrication was perfect and did not contribute to the excessive heat, which was plainly seen to have been caused by the heavy ends.

That some lubricating oils from some crudes had less of a tendency to absorb gasoline or heavy ends than others was known before, but it never was demonstrated more convincingly under actual working conditions than that afternoon at Helena and on the hotter days that were to follow. It showed that very few of the heavy ends got by the tight seal around the piston rings and kept on top the lubricating oil and away from the circulating pumps. The oil pressure would have dropped to the danger point if it had not been for this fact.

Greenville and Vicksburg, Miss., were reached by flying low after taking off and not further loading the engines by climbing for altitude. The best gasoline obtainable got poorer, and the weather hotter, and a couple of the water jackets on the cylinders started leaking. This was the result of the extreme heat caused by low gravity, high initial and high end point gasoline. At Baton Rouge gasoline which was equal to the Air Service specifications was procurable.

Effect of Good Gasoline

During these last few hops the best the engines would turn was 1350 r.p.m. The first hop at Baton Rouge after filling up with this suitable gasoline and without any repairs to the engines the revolutions increased to 1500. The oil pressure went up to 2 lb. above the average, the oil temperature went down to normal, and the water temperature dropped off 25 deg. It was also possible to climb readily without overheating.

The records of the log-book were analyzed at New Orleans and they showed that the Santa Maria, during the four weeks it had been using Lakeside Aviation Oil, had consumed only 48 per cent of the quantity it had previously used. This was conclusive proof that the use of low gravity, high end point gasoline was the cause of the overheating and its attendant evils, which would not have been encountered had it been possible to secure regular aviation gasoline.

It showed that there is an urgent need for aero clubs and chambers of commerce to induce sellers of gasoline everywhere to carry a supply of aviation gasoline and lubricating oil. These same agencies should also work to have all present landing fields and air-ports equipped with these same necessary supplies of suitable grade and quality. If the federal, state, city or town governments do not soon establish uniform landing fields, the time will come before they realize it when the localities without landing fields will be in the same position as the locality which does not have a railroad running through it.

A Letter

Editor, AVIATION AND AIRCRAFT JOURNAL:

A copy of the Sept. 15 issue of your journal has just come into our hands and we have examined with considerable interest the reprint of the proposed Aeronautical Safety Code.

As we understand it, this code is being developed by the Sectional Committee on Aeronautical Safety Code which was recently organized under the rules of the American Engineering Standards Committee, and the Bureau of Standards and the Society of Automotive Engineers are the sponsors for this code.

In your listing of the representatives who attended this meeting, Professor E. P. Warner was inadvertently placed in the S.A.E. list when in reality he is the representative of this Society on the Sectional Committee.

C. B. LEPAGE

Secretary, Standards and Technical Committees, A.S.M.E.

Examination of Navy Reserve Officers

The following memorandum concerning examinations of reserve and temporary officers for commission in the line of the U. S. Navy, which was prepared by the Bureau of Aeronautics, Navy Department, is of interest:

1. The following tabulation shows in chronological order the sequence of events connected with the examination and recommendations for commission of certain reserve and temporary officers for commission in the line of the Navy under Act of June 4, 1920:

August, 1919—Director of Naval Aviation sent letter to Commanding Officers of all Air Stations, Commanders Air Forces, stating that examinations would be held and directed Commanding Officers to start classes of instruction.

June 4, 1920—Congress passed Act H.R. 13108, authorizing transfer of temporary and reserve officers to permanent rank or grade for which they might be found qualified.

August, 1920—Bureau of Navigation issuer a circular letter to the service stating examinations authorized above would be held starting May 16, 1921.

May 16, 1921—Examinations started.

Oct. 6, 1921—Bureau of Navigation published a list of temporary and reserve officers found qualified for permanent commission, as follows:

Recommendation of Examining Board

The following was the recommendation of the Examining Board:

Number who took the examination	1651	
Number who failed to finish	21	
Number considered for commissions	1630	
Number recommended for commissions	931	
Number recommended for Ch. Warrant and Warrant Grade	370	
Number not recommended	329	
Total	1630	
Percentage recommended for commissions	57.1	per cent
Percentage recommended for Ch. W. and W. grade	22.7	per cent
Percentage not recommended	20.2	per cent
Total	100.0	
Number of temporaries who took the examination	1192	
No. of Reserves (Classes 1, 2, 3, 4) took examination.	194	
No. of Reserves (Class 5-Flying Corps) took examination.	244	
Total	1630	
No. of Temporaries rec. for commission	694	58.2 per cent
No. of Reserves (Cl. 1, 2, 3, 4) commission	85	43.8 per cent
No. of Reserves (Cl. 5) rec. for commission	152	62.3 per cent

SPENCER S. WOOD
Rear Admiral, U. S. N., President
BENJAMIN C. BRYAN,
Rear Admiral, U. S. N., Member
ROBERT W. MCNEELY,
Captain, U. S. N., Member.

2. From the above it is to be noted that the number of officers of Class 5, Reserve (*Aviation officers*) who were recommended for commission by the Secretary of the Navy is higher than any other group of officers taking these examinations.

3. Examinations as held were competitive in nature, similar to examinations held for entrance to the Naval Academy. The examinations were held at the same hour and date all over the world, and examination papers were forwarded to Washington, where they were marked by the Naval Examining Board. Candidates who were unable to be present at the examinations at the hour and date named, due to sickness or other cause, were not permitted to take another examination, this in view of the fact that the examination was of a competitive nature.

4. The Act of June 4, 1920 (H.R. Bill 13108) authorized the admission to the line of the Regular Navy, *in the permanent grades or ranks for which they might be found qualified, of 1200 officers, 500 of whom could be aviation officers (Class 5).*

5. Examinations were given in all professional subjects of which a knowledge is required of line officers of the Navy. The law requires, very properly, that all officers, including Aviation officers, should qualify in regular line subjects. It must be realized that a Naval Aviator, in addition to being able to fly, must have a thorough knowledge of navigation, a sufficient knowledge of seamanship, a thorough knowledge of gunnery and weapons used in airplanes, bombs, Naval ordnance, spotting and a certain amount of international law in case he should land in a foreign country on a foreign shore. He should understand a certain amount of electricity in order to communicate, as well as for the safety and operation of his plans or balloon. These subjects are necessary, owing to the fact that the majority of Naval Aviators are later returned to regular duty as line officers. Class 5 officers were given the special privilege of omitting one of the following subjects—navigation, steam engineering, ordnance and gunnery, electricity—and were permitted to take in its place a special examination on aviation subjects. It is a notable fact that quite a number of the class 5 officers did not elect to take their own subject—aviation—and also that a number of them failed to pass in this subject. It will be noted that eleven and a half months elapsed from the time notice was given that the examinations were to be held and the time of holding the examinations, so that they had ample time to prepare themselves. It is true that the bombing experiments took up much time just before the examinations, but had these officers taken advantage of opportunities to study, it is believed that nearly all of them could have passed. At the stations where they were compelled to study, nearly all passed. For instance, at Howden, England, all the reservists and temporaries passed. At San Diego 63 per cent passed, and at Pensacola 57 per cent passed.

6. The Aviation questions were prepared by qualified aviators, and the papers were marked by aviators. Great weight was given by the Examining Board to reports on fitness, and the action of the Examining Board was most liberal.

7. Subjects covered by the examination were: Navigation, engineering, ordnance and gunnery, seamanship, international law, military law, electricity, aeronautics, Navy regulations.

8. The following was the result of the *Aeronautic Examinations*

Of Temporaries ..... 58.2 per cent passed
Of Reserves
Class 1, 2, 3, and 4 ..... 43.8 per cent passed
Class 5 (Aviators) ..... 62.3 per cent passed
Of 244 Class 5 Aviators
39 took Line examinations voluntarily omitting Aeronautic examinations.
205 took Aeronautics.
Of 205 Aviators who took Aeronautics
81 Aviators failed in Aeronautics their own speciality.
Of 31 Temporaries who took Aeronautics
17 Temporaries failed in Aeronautics.

NOTE: The questions in Aeronautics were made up by officers now in Bureau of Aeronautics and were marked by three qualified aviators.

The officers who, through no fault of their own, were prevented from taking the examinations will be given an opportunity to take an examination.

Foreign Aeronautical News

Brazil

The Directoria de Meteorologia e Astronomia of the Brazilian Department of Agriculture has been divided into two separate services, that of meteorology and the National Observatory. The meteorological service will continue the climatical work, established in 1919, standardizing the methods of all meteorological activities in the country and publishing all available data for the last 10 years. It will also establish a forecast service for central and southern Brazil; an aerological service for aviators and for the general progress of meteorological science creating kite and pilot balloon stations; a special coast service for navigation; agricultural and marine meteorology services; a special service of rains and floods; and the usual investigations in every department of meteorology, which may possibly lead to longer ranges in forecasting weather.

An important aerial transport company has been formed in Rio Grande do Sul for regular passenger and freight service between that city and distributing centers in the various neighboring states. The machines are of French manufacture.

England

Four British airplanes recently left London for Madrid for delivery to the Spanish military authorities for use in Morocco against the Moors. They were assembled at the aircraft factory at Croydon by the Aircraft Disposals Co. Three of the airplanes are Bristol Fighters, equipped with 300 hp. Hispano-Suiza engines, while the other is a DH4 Daylight Bomber. This is the second batch of British fighting airplanes flown to Spain and delivered to the Spanish Military Air Service.

The vote for Civil Aviation for 1921-22 amounts to £1,000,000. Of this about £425,000 is all allocated for the maintenanee of airdromes, salaries and wages, works, buildings, lands, purchase of experimental aircraft, etc., for the development of civil heavier-than-air craft.

Ecuador

Two SVA 130 hp. planes have been imported from Italy and presented to the Ecuadorian government by the University Patriotic Club and the Syrian Colony. There are now seven planes in the government service and one more is promised by the Chinese colony. The National Government has contracted with an Italian manufacturer to furnish 12 airplanes with the equipment for repair shops. The Bank of Ecuador and the Commercial and Agricultural Bank have each contributed 15,000 sucres toward the Government aviation field across the river from Guayquil. The total subscription for the field exceeds 50,000 sucres (approximately $25,000).

Germany

The Bavarian authorities are making arrangements to establish a first class airport at Munich. Discussions between the Federal States have taken place in the subject of Munich's favorable situation in relation to the continental airways of the future. An air service has been established between Danzig and Riga, linking up with the service from Danzig to Germany three times a week.

Powerful groups have been formed in Germany for the development of aerial mails. These groups are seeking the cooperation of foreign companies in Sweden, Denmark, Holland, England, Italy, Austria and the United States, in order to develop the international lines of the future. This aerial system, according to the Germans, will be the beginning of an international system which will include France, America, Italy, Spain, Africa, Austria, the East, and also Russia.

India

The Air Board of India, under the Commerce Department, is a purely advisory body without executory functions. As soon as funds are available, the Government of India has decided to prepare a trunk air route from Rangoon (via Calcutta and Allahabad) to Bombay. When this route, or a section of it, is completed, tenders will be called for an air mail service over the complete portion. Local governments in India have also been empowered to lay out air routes within their own boundaries.

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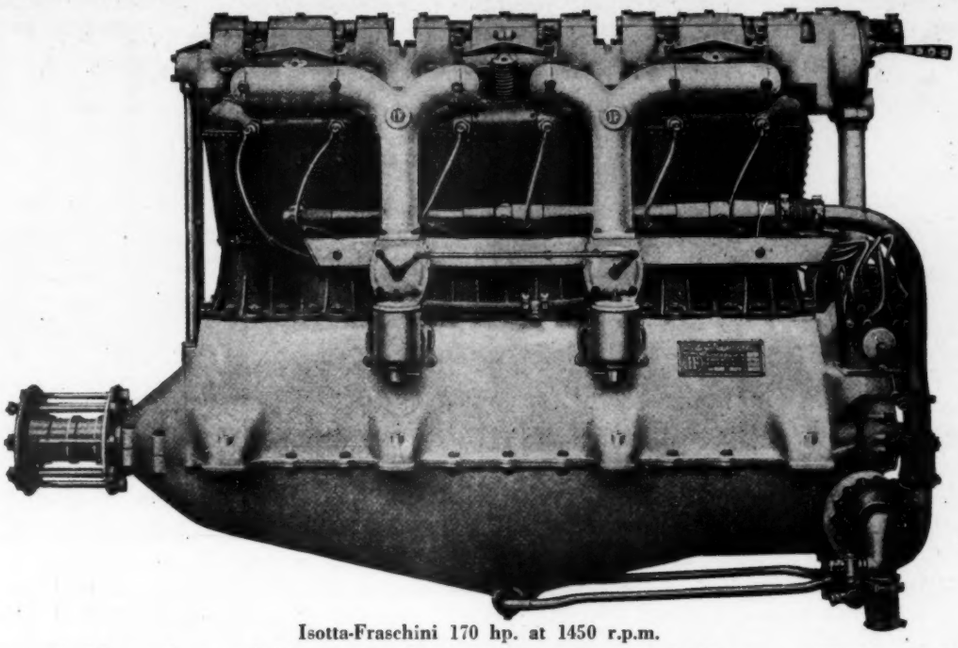

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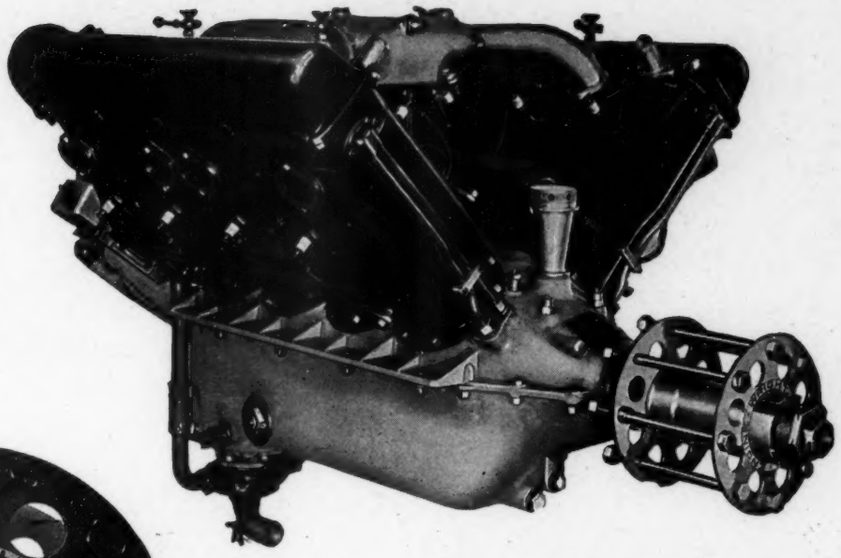

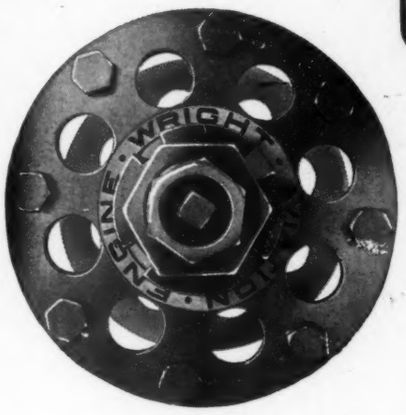

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